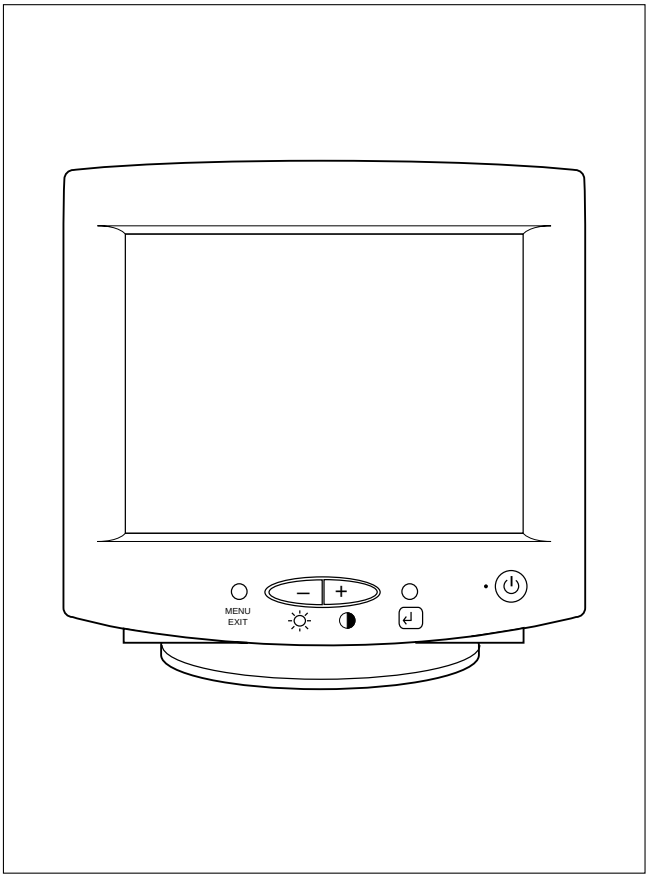
SAMSUNG

COLOR MONITOR

CKB5237L
CKB7227L

SERVICE Manual

COLOR MONITOR



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1 Precautions

Follow these safety, servicing and ESD precautions to prevent damage and to protect against potential hazards such as electrical shock and X-rays.

1-1 Safety Precautions

1-1-1 Warnings

1. For continued safety, do not attempt to modify the circuit board.
2. Disconnect the AC power before servicing.
3. When the chassis is operating, semiconductor heatsinks are potential shock hazards.

1-1-2 Servicing the High Voltage System and CRT

WARNING: A high voltage VR replaced in the wrong direction may cause excessive X-ray emissions.

Caution: When replacing the high voltage adjustment VR, it must be fixed by a soldering iron after it is properly set.

1. When servicing the high voltage system, remove the static charge by connecting a 10k ohm resistor in series with an insulated wire (such as a test probe) between the chassis and the anode lead. (Disconnect the AC line cord from the AC outlet.)
2. **High Voltage VR Replacement**
   If the high voltage system requires adjustment, use the following procedure (all steps are required):
   a. Turn the power off and disconnect the AC line cord from the power source.
   b. Unsolder and remove the high voltage VR on the Main PCB.
   c. Replace the VR and adjust the high voltage to the specification.
   d. Using a soldering iron, melt the adjustment cap on the high voltage VR to prevent any movement.
3. It is essential that service technicians have an accurate high voltage meter available at all times. Check the calibration of this meter periodically.
4. When troubleshooting a monitor with excessively high voltage, avoid being unnecessarily close to the monitor. Do not operate the monitor for longer than is necessary to locate the cause of excessive voltage.
5. High voltage should always be kept at the rated value, no higher. Be sure all service personnel are aware of the procedures and instructions covering X-rays.

   The only potential source of X-ray in current solid state display monitors is the tube. However, the CRT does not emit measurable X-ray radiation if the high voltage is at the high voltage adjustment value.

   Only when high voltage is excessive are X-rays capable of penetrating the shell of the CRT, including the lead in glass material. Operation at high voltages may also cause failure of the CRT or high voltage circuitry.
6. When the high voltage regulator is operating properly, there is no possibility of an X-ray problem. Test the brightness and use a meter to monitor the high voltage each time a color monitor comes in for service. Make sure the high voltage does not exceed its specified value and that it is regulating correctly.
7. The CRT is especially designed to prohibit X-ray emissions. To ensure continued X-ray protection, replace the CRT with only one that is the same or equivalent type as the original. Carefully reinstall the CRT shields and mounting hardware; these also provide X-ray protection.
8. Handle the CRT only when wearing shatterproof goggles and after completely discharging the high voltage anode.
9. Do not lift the CRT by the neck.

1-1-3 Fire and Shock Hazard

Before returning the monitor to the user, perform the following safety checks:

1. Inspect each lead dress to make certain that the leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the monitor.
2. Inspect all protective devices such as nonmetallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators, etc.

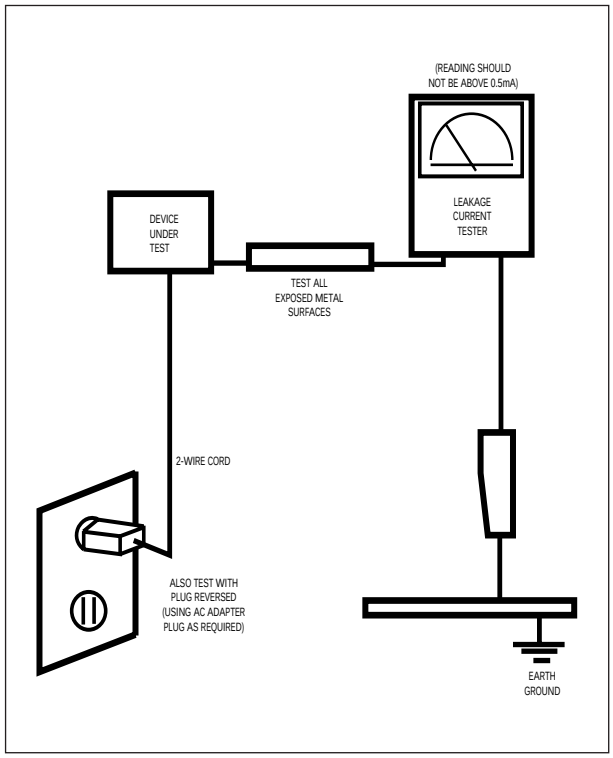


Figure1-1. Leakage Current Test Circuit

3. Leakage Current Hot Check (Figure 1-1):
   WARNING: Do not use an isolation transformer during this test.
   Use a leakage current tester or a metering system that complies with American National Standards Institute (*ANSI C101.1, Leakage Current for Appliances*), and Underwriters Laboratories (*UL Publication UL1410, 59.7*).
4. With the unit completely reassembled, plug the AC line cord directly into a 120V AC outlet. With the unit's AC switch first in the ON position and then OFF, measure the current between a known earth ground (metal water pipe, conduit, etc.) and all exposed metal parts, including: metal cabinets, screwheads and control shafts. The current measured should not exceed 0.5 milliamp. Reverse the power-plug prongs in the AC outlet and repeat the test.

1-1-4 Product Safety Notices

Some electrical and mechanical parts have special safety-related characteristics which are often not evident from visual inspection. The protection they give may not be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by ⚠ on schematics and parts lists. A substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire and / or other hazards. Product safety is under review continuously and new instructions are issued whenever appropriate.

Components identified by ☢ on schematics and parts lists must be sealed by a soldering iron after replacement and adjustment.

1-2 Servicing Precautions

WARNINGS: A high voltage VR replaced in the wrong direction may cause excessive X-ray emissions.
An electrolytic capacitor installed with the wrong polarity might explode.

Cautions: Before servicing instruments covered by this service bulletin, read and follow the Safety Precautions section of this manual.

When replacing the high voltage adjustment VR, it must be fixed by a soldering iron after it is properly set.

Note: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions.

1-2-1 General Servicing Precautions

1. Servicing precautions are printed on the cabinet, and should be followed closely.
2. Always unplug the unit's AC power cord from the AC power source before attempting to:
   (a) remove or reinstall any component or assembly, (b) disconnect PCB plugs or connectors, (c) connect a test component in parallel with an electrolytic capacitor.
3. Some components are raised above the printed circuit board for safety. An insulation tube or tape is sometimes used. The internal wiring is sometimes clamped to prevent contact with thermally hot components. Reinstall all such elements to their original position.
4. After servicing, always check that the screws, components and wiring have been correctly reinstalled. Make sure that the area around the serviced part has not been damaged.
5. Check the insulation between the blades of the AC plug and accessible conductive parts (examples: metal panels, input terminals and earphone jacks).
6. Insulation Checking Procedure: Disconnect the power cord from the AC source and turn the power switch ON. Connect an insulation resistance meter (500 V) to the blades of the AC plug.

   The insulation resistance between each blade of the AC plug and accessible conductive parts (see above) should be greater than 1 megohm.
7. Never defeat any of the +B voltage interlocks. Do not apply AC power to the unit (or any of its assemblies) unless all solid-state heat sinks are correctly installed.
8. Always connect a test instrument's ground lead to the instrument chassis ground *before* connecting the positive lead; always remove the instrument's ground lead last.

1-3 Electrostatically Sensitive Devices (ESD) Precautions

Some semiconductor (solid state) devices can be easily damaged by static electricity. Such components are commonly called Electrostatically Sensitive Devices (ESD). Examples of typical ESD devices are integrated circuits and some field-effect transistors. The following techniques will reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground. Alternatively, wear a discharging wrist-strap device. To avoid a shock hazard, be sure to remove the wrist strap before applying power to the monitor.
2. After removing an ESD-equipped assembly, place it on a conductive surface such as aluminum foil to prevent accumulation of an electrostatic charge.
3. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESDs.
4. Use only a grounded-tip soldering iron to solder or desolder ESDs.
5. Use only an anti-static solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESDs.
6. Do not remove a replacement ESD from its protective package until you are ready to install it. Most replacement ESDs are packaged with leads that are electrically shorted together by conductive foam, aluminum foil or other conductive materials.
7. Immediately before removing the protective material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.

   Caution: Be sure no power is applied to the chassis or circuit and observe all other safety precautions.

8. Minimize body motions when handling unpackaged replacement ESDs. Motions such as brushing clothes together, or lifting your foot from a carpeted floor can generate enough static electricity to damage an ESD.
9. ⚠ Indicates ESDs on the Schematic Diagram in this manual.

2 Product Specifications

2-1 Specifications

Item	Description	
Picture Tube:	17-Inch (43 cm): 15.7-inch (39.80 cm) viewable; 15-Inch (38 cm): 13.8-inch (35 cm) viewable; Full-square flat-face tube, 90° Deflection, 0.28 mm Dot pitch, Semi- tint, Non-glare, Invar shadow mask, Anti-static silica coating	
Scanning Frequency	Horizontal : 30 kHz to 70 kHz (Automatic) Vertical : 50 Hz to 120 Hz (Automatic)	
Display Colors	Unlimited colors	
Maximum Resolution	Horizontal : 1280 Dots Vertical : 1024 Lines	
Input Video Signal	Analog, 0.714 Vp-p positive at 75 Ω, internally terminated	
Input Sync Signal	Separate Sync : TTL level positive/negative	
Maximum Pixel Clock rate	110 MHz	
Active Display	CKB5237L ; Horizontal : 267 mm ± 3 mm, Vertical : 200 mm ± 3 mm CKB7227L ; Horizontal : 306 mm ± 3 mm (4:3 ratio), Vertical : 230 mm ± 3 mm	
Input Voltage	AC 90 to 264 Volts, 60 Hz or 50 Hz ± 3 Hz	
Power Consumption	90 Watt (max) : 17", 85 Watt (max) : 15"	
Dimensions	CKB5237L	CKB7227L
Unit (W x D x H) Carton (W x D x H)	14.6 x 15.6 x 15.5 Inches (370 x 397 x 394 mm), 18.2 x 21.0 x 17.7 Inches (462 x 534 x 450 mm)	16.8 x 17.0 x 17.1 Inches (426 x 433 x 434 mm) 21.3 x 21.8 x 21.2 Inches (541 x 554 x 538 mm)
Weight (Net/Gross)	CKB5237L : 30 lbs (13.6 kg) / 35.3 lbs (16.0 kg) CKB7227L : 40.8 lbs (18.5 kg) / 46.7 lbs (21.2 kg)	
Environmental Considerations	Operating Temperature : 32°F to 104°F (0°C to 40°C) Humidity : 10 % to 80 % Storage Temperature : -4°F to 113°F (-20°C to 45°C) Humidity : 5 % to 95 %	
CRT Code No.	BH03-10337T : M41KUN36X03(E/L/LP), Silica Coating - 17" BH03-10337U : M41KUN36X03(A/L/LP), Multi Coating - 17" BH03-10337V : M41KUN36X03(T4/L/LP), Multi Coating (TCO) - 17" BH03-10337W : M41KUK35X02(E/LP), ESF - 15" BH03-10337X : M36KUK35X02(T4/LP), Multi Coating (TCO) - 15"	

- Above models comply with SWEDAC (MPR II) recommendations for reduced electromagnetic fields.
- Designs and specifications are subject to change without prior notice.

2-2 Pin Assignments

Sync Type / Pin No.	15-Pin Signal Cable Connector (Figure 2-5)	Cable Adapter (Figure 2-6)
	Separate	Macintosh
1	Red	GND-R
2	Green	Red
3	Blue	H/V Sync
4	GND	Sense 0
5	DDC Return	Green
6	GND-R	GND-G
7	GND-G	Sense 1
8	GND-B	Reserved
9	Reserved	Blue
10	GND-Sync/Self-raster	Sense 2
11	GND	GND
12	DDC Data	V-Sync
13	H-Sync	GND-B
14	V-Sync	GND
15	DDC Clock	H-Sync

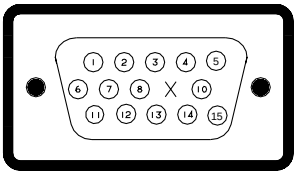


Figure 2-5. Male Type

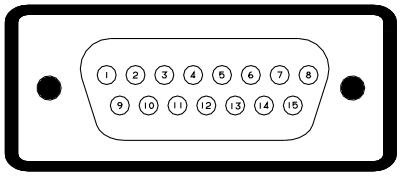


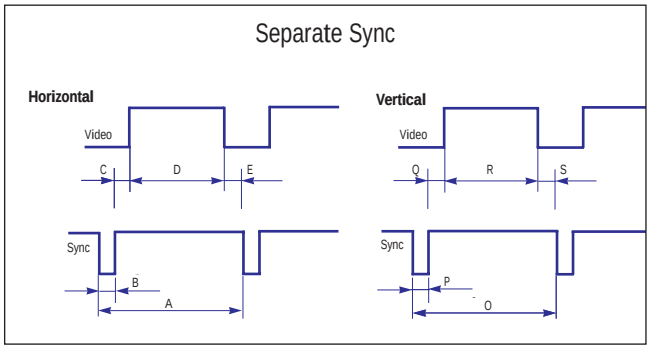
Figure 2-6. Male Type

2-3 Timing Chart

This section of the service manual describes the timing that the computer industry recognizes as standard for computer-generated video signals.

Table 2-1. Timing Chart

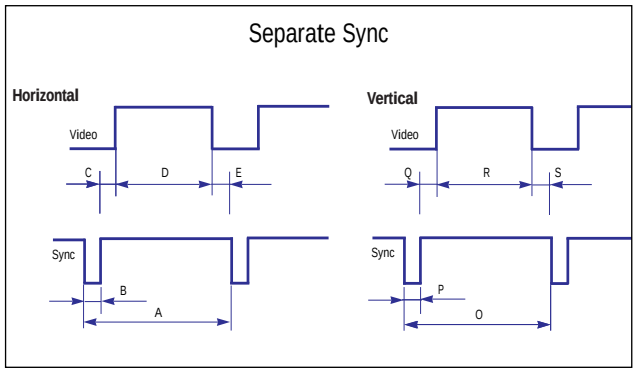
Mode / Timing	IBM		VESA		
	VGA2/70 Hz 720 x 400	**VGA3/60 Hz 640 x 480**	**640/75 Hz 640 x 480**	**640/85 Hz 640 x 480**	**800/75 Hz 800 x 600**
fH (kHz)	31.469	31.469	37.500	43.269	46.875
A µsec	31.778	31.778	26.667	23.111	21.333
B µsec	3.813	3.813	2.032	1.556	1.616
C µsec	1.907	1.907	3.810	2.222	3.232
D µsec	25.422	25.422	20.317	17.778	16.162
E µsec	0.636	0.636	0.508	1.556	0.323
fv (Hz)	70.087	59.940	75.000	85.008	75.000
O msec	14.268	16.683	13.333	11.764	13.333
P msec	0.064	0.064	0.080	0.671	0.064
Q msec	1.080	1.048	0.427	0.578	0.448
R msec	12.711	15.253	12.800	11.093	12.800
S msec	0.413	0.318	0.027	0.023	0.021
Clock Frequency (MHz)	28.322	25.175	31.500	36.000	49.500
Polarity H.Sync	Negative	Negative	Negative	Negative	Positive
V.Sync	Positive	Negative	Negative	Negative	Positive
Remark	Separate	Separate	Separate	Separate	Separate



A : Line time total	B : Horizontal sync width	O : Frame time total	P : Vertical sync width
C : Back porch	D : Active time	Q : Back porch	R : Active time
E : Front porch		S : Front porch	

Table 2-1. Timing Chart Continued

Mode / Timing	VESA		
	800/85Hz 800 x 600	**1024/75 Hz 1024 x 768**	**1024/85 Hz 1024 x 768**
fH (kHz)	53.674	60.023	68.677
A µsec	18.631	16.660	14.561
B µsec	1.138	1.219	1.016
C µsec	2.702	2.235	2.201
D µsec	14.222	13.003	10.836
E µsec	0.569	0.203	0.508
fv (Hz)	85.061	75.029	84.997
O msec	11.756	13.328	11.765
P msec	0.056	0.050	0.044
Q msec	0.503	0.466	0.524
R msec	11.179	12.795	11.183
S msec	0.019	0.017	0.015
Clock Frequency (MHz)	56.250	78.750	94.500
Polarity H.Sync	Positive	Positive	Positive
V.Sync	Positive	Positive	Positive
Remark	Separate	Separate	Separate

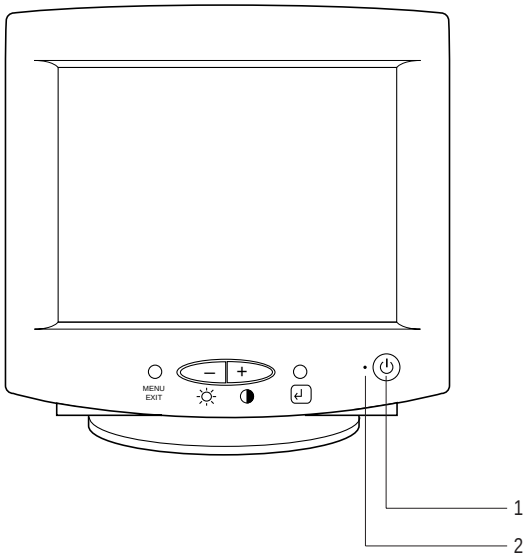


A : Line time total	B : Horizontal sync width	O : Frame time total	P : Vertical sync width
C : Back porch	D : Active time	Q : Back porch	R : Active time
E : Front porch		S : Front porch	

3 Opearating Instructions

3-1 Front View and Control

3-1-1 CKB5237L/7227L Front View



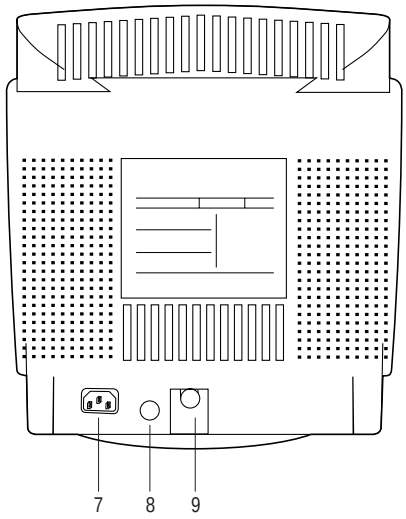


Figure 3-2. Rear View

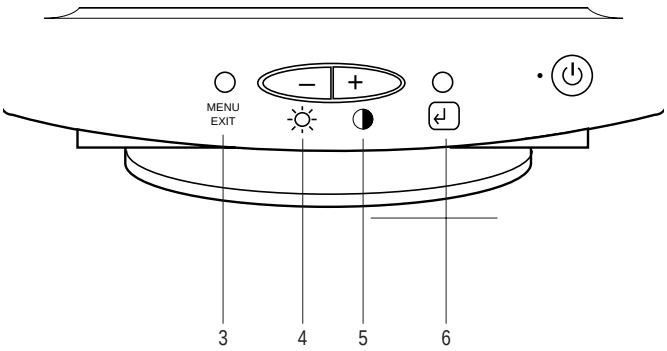


Figure 3-1. Front Control Panel

Table 3-1. Front Panel Controls

Location	Symbol	Description
1	⏻	Power Button
2	●	Power Indicator LED (Dual Color)
3	○ MENU EXIT	Menu Display & Menu Exit
4	− ☼	Down Button & Brightness
5	+ ◑	Up Button & Contrast
6	○ ↵	Menu Selector Enter Key
7		3 Pin AC Power Input
8	○	USB Jack Input (Optional)
9		Signal Input

3-2-1 On Screen Display

This monitor features an On-Screen Display (OSD) that shows information about the display setting. The OSD appears on the screen when you select a function button. The OSD can show the name, range and current setting of the control function. In addition, the OSD shows the current input signal frequency and the list of user and factory preset timings. The OSD remains active for approximately 5 seconds after the completion of any adjustment.

3-2-2 OSD Window

Push the menu button to open the OSD. The Main Menu shows all of the adjustment icons along the top of the window. The window shows one or more adjustment names in the Adjustment Box and instructions display in the Information Bar.

To access a function, use the menu button to move to its associated icon, and then use the ⊖ or ⊕ button to select the adjustment type. Then, push the ↵ button to access the function.

All OSD windows change color to indicate that the associated adjustment control is active. When the OSD displays the name of the adjustment, for example, Pincushion / Trap, with a green border, adjustments for pincushion or trapezoidal effects are available. Each OSD window shows directions for use along the bottom of the window. When you are satisfied with the adjustments you have made to the current control, select the Exit button to return to the OSD Menu where you can select another control, or exit from the OSD system and save your changes. The OSD remains active for approximately 10 seconds after completion of any adjustments.

3-2-4 Direct Controls

The on-screen Direct controls have the following two functions:

- Brightness: With the menu off, push the ⊖ button. The brightness display will appear.
  Push the ⊕ button to increase the brightness or the ⊖ button to decrease the brightness.
- Contrast: With the menu off, push the ⊕ button. The contrast adjustment display will appear.
  Push the ⊕ button to increase the contrast or the ⊖ button to decrease the contrast.

Note 1: This monitor requires a cable adapter for use with a Macintosh computer. The MacMaster Cable Adapter supports all monitors and all Macintosh, Centris, Quadra, Duo Dock, and Power Macintosh computers. If you do not already have a cable adapter, check with your computer dealer.

Note 2: When used with a computer equipped with VESA DPMS functions, this monitor is EPA Energy Star compliant and NUTEK compliant.

Table 3-2. Display Power Management Signaling (DPMS) ;CKB7227L

State / Items	Normal Operation	Power saving function EPA/NUTEK		
		Stand-By Mode	Suspend Mode Position A	Power Off Mode Position B
Horizontal Sync	Active	Inactive	Active	Inactive
Vertical Sync	Active	Active	Inactive	Inactive
Video	Active	Blanked	Blanked	Blanked
Power Indicator	Green	Amber	Alternating Amber/Green Blinking	Amber Blinking
Power Consumption/hr	90 W (max.) 78 W (nominal)	72 W (max.) 65 W (nominal)	Less than 15 W	Less than 8 W

Table 3-3. Display Power Management Signaling (DPMS) ;CKB5237L

State / Items	Normal Operation	Power saving function EPA/NUTEK		
		Stand-By Mode	Suspend Mode Position A	Power Off Mode Position B
Horizontal Sync	Active	Inactive	Active	Inactive
Vertical Sync	Active	Active	Inactive	Inactive
Video	Active	Blanked	Blanked	Blanked
Power Indicator	Green	Amber	Alternating Amber/Green Blinking	Amber Blinking
Power Consumption/hr	85 W (max.) 70 W (nominal)	72 W (max.) 65 W (nominal)	Less than 15 W	Less than 8 W

Memo

4 Disassembly and Reassembly

This section of the service manual describes the disassembly and reassembly procedures for the CKB5237L / 7227L monitors.

WARNING: This monitor contains electrostatically sensitive devices. Use caution when handling these components.

4-1 Disassembly (CKB7227L)

Cautions: 1. Disconnect the monitor from the power source before disassembly.
2. Follow these directions carefully; never use metal instruments to pry apart the cabinet.

4-1-1 Cabinet Disassembly

1. With a pad beneath it, stand the monitor on its front with the screen facing downward and the base close to you. Make sure nothing will damage the screen.
2. Working from the back of the monitor remove the signal cover cap out, and remove the 4 screws and carefully pull the rear cabinet up and off the monitor.
3. Remove the 8 screws on the Top Shield and remove it.
4. Remove the 4 screws on the Bottom Cover and pull it upward to remove it.
5. Using pinch-nosed pliers or long-nosed pliers, carefully disconnect the Anode Cap from the CRT.

4-1-2 Removing the Video PCB & CRT Socket PCB

1. Follow steps 1 through 5 in “Cabinet Disassembly,” above.
2. Disconnect connectors CN103.
3. Lift off the CRT Socket PCB Assembly.
4. Hold the CRT Socket PCB Assembly while you lift the cap on the CRT Socket and pull out the two focus wires, G2 wire.
5. Remove both side screws on the lower edge of the Video PCB Ass’y and the screw on the signal connector and pull the assembly towards you to remove it.
6. Remove all screws on the Video PCB Assembly and remove the Video Shield.
7. Lift out the Video PCB and place it on a flat, level surface that is protected from static electricity.

4-1-3 Removing the Main PCB

1. Follow steps 1 through 5 in “Cabinet Disassembly,” steps 1 through 7 in “Removing the Video PCB and “Removing the CRT Socket PCB,” above.
2. Disconnect the Degaussing Coil at CN600 on the Main PCB.
3. Disconnect all easily accessible ground wires from the CRT GND Assembly and Bottom Chassis.
4. Disconnect the connector between CN_Tilt. on the Main PCB and the Tilt coil.
5. Disconnect the DY connector between the DY and the CN300A_7, CN400, CN401 and CN402 connectors on the Main PCB.
6. Remove the 2 screws on the left and right sides of the PCB Bracket.
7. Carefully lift the Main PCB Ass’y.
8. Remove the 7 screws on the top side of the Main PCB.
9. Lift the Main PCB and place it on a flat, level surface that is protected from static electricity.

4-1-4 CRT Ass'y Disassembly

1. Complete all previous steps.
2. Remove the 4 side screws 2 on the top and 2 on either side of the CRT and lift the CRT Unit Bracket.
3. Unhook the Degaussing Coil Assembly and lift it off the CRT.
4. Remove the 4 corner screws and lift the CRT up and away from the Front Cover Assembly and place it on a padded surface.

⚠ **Do not lift the CRT by the neck.**

Caution: If you will be returning this CRT to the monitor, be sure to place the CRT face down on a protective pad.

4-2 Reassembly (CKB7227L)

With the CRT facing downward on a protective pad, use the steps that follow to reassemble the monitor.

4-2-1 Replacing the CRT

1. Loop the CRT Ground Assembly around the back of the CRT and under the 3 corner, metal ears. Position the corner with the spring last.
2. With the Front Cover Assembly lying face down on a protective pad, position the CRT so that the corner metal ears fit properly in the Front Cover Assembly.
3. Replace the 4 corner screws.
4. Replace the Degaussing Coil Assembly and secure the Coil with the plastic Degaussing Coil Holders.
5. Replace the CRT Ground Assembly.
6. Replace the Unit Bracket Assembly.

4-2-2 Replacing the Main PCB

1. Stand the monitor on its front with the screen facing downward.
2. Replace the 7 screws on the top side of the Main PCB.
3. Position the Main PCB Ass'y in the Front Cabinet and secure it on both sides with the screws between the Bottom Chassis and CRT Unit Bracket.
4. Replace the DY connector at the CN300A_7, CN400, CN401 and CN402 connectors on the Main PCB.
5. Replace the connector between CN_Tilt. on the Main PCB and the Tilt Coil.
6. Replace all easily accessible ground wires on the CRT GND Assembly and Bottom Chassis.
7. Replace the Degaussing Coil at CN600 on the Main PCB.
8. Replace the Anode Cap.

4-2-3 Replacing Connector CN103 on the Video PCB

1. Position the Video Shield and replace all screws.
2. Replace both side screws on the lower edge of the Video PCB Ass'y and the screw on the signal connector.

4-2-4 Replacing the CRT Socket PCB

1. Hold the CRT Socket PCB Ass'y while you lift the Cap on the CRT Socket and replace the two Focus wires, G2 wire.
2. Reconnect the CRT Socket on the CRT pins at the plug / Socket junction.

4-2-5 Cabinet Reassembly

1. Reconnect CN103 on the Video PCB.
2. Position the Top Shield and replace the 8 screws.
3. Replace the 4 screws on the Bottom Cover.
4. Position the Rear Cover making sure that the tabs along the front edge are properly snapped in place. Replace the 4 screws.
5. Replace the signal cable cover cap.
6. Set the monitor on its Base and make sure that the CRT faceplate was not scratched or otherwise damaged.

4-3 Disassembly (CKB5237L)

Cautions: 1. Disconnect the monitor from the power source before disassembly.
2. Follow these directions carefully; never use metal instruments to pry apart the cabinet.

4-3-1 Cabinet Disassembly

1. With a pad beneath it, stand the monitor on its front with the screen facing downward and the base close to you. Make sure nothing will damage the screen.
2. Working from the back of the monitor remove the signal cover cap out, and remove the 4 screws and carefully pull the rear cabinet up and off the monitor.
3. Using pinch-nosed pliers or long-nosed pliers, carefully disconnect the Anode Cap from the CRT.

4-3-2 Removing the Video PCB & CRT Socket PCB

1. Follow steps 1 through 3 in “Cabinet Disassembly,” above.
2. Remove the 1 screw on the Video Shield Top position.
3. Disconnect connector C103.
4. Lift off the CRT Socket PCB Assembly.
5. Hold the CRT Socket PCB Assembly while you lift the cap on the CRT Socket, unsolde 1 point wire, remove 9 pin wire Assembly, unsolder 4 point on the corner shild of CRT Socket PCB and remove shield of CRT Socket PCB.
6. Remove 5 point screws side the lower edge and back of the Video PCB Assembly, and the screw on the signal conector and pull the Assembly towards you to remove it.
7. Remove all screws on the Video PCB Assembly and remove the Video Shield.
8. Lift out the Video PCB and place it on a flat, level surface that is protected from static electricity.

4-3-3 Removing the Main PCB

1. Follow steps 1 through 3 in “Cabinet Disassembly,” steps 1 through 8 in “Removing the Video PCB and “Removing the CRT Socket PCB,” above.
2. Disconnect the Degaussing Coil at CN600 on the Main PCB.
3. Disconnect all easily accessible ground wires from the CRT GND Assembly and Bottom Chassis.
4. Disconnect the connector between CN_Tilt. on the Main PCB and the Tilt coil.
5. Disconnect the DY connector between the DY and the CN301_5, CN400, CN401 and CN402 connectors on the Main PCB.
6. Remove the 2 screws on the left and right sides of the PCB Bracket.
7. Carefully lift the Main PCB Ass’y.
8. Remove the 7 screws on the top side of the Main PCB.
9. Lift the Main PCB and place it on a flat, level surface that is protected from static electricity.

4-4 Reassembly (CKB5237L)

With the CRT facing downward on a protective pad, use the steps that follow to reassemble the monitor.

4-4-1 Replacing the CRT

1. Loop the CRT Ground Assembly around the back of the CRT and under the 4 corner, metal ears. Position the corner with the spring last.
2. With the Front Cover Assembly lying face down on a protective pad, position the CRT so that the corner metal ears fit properly in the Front Cover Assembly.
3. Replace the 4 corner screws.
4. Replace the Degaussing Coil Assembly and wrap the coil with the plastic coated matal ties to hold the coil in place.
5. Replace the CRT Ground Assembly.
6. Replace the Unit Bracket Assembly.

4-4-2 Replacing the Main PCB

1. Stand the monitor on its front with the screen facing downward.
2. Replace the 7 screws on the top side of the Main PCB.
3. Position the Main PCB Ass'y in the Front Cabinet and secure it on both sides with the screws between the Bottom Chassis and CRT Unit Bracket.
4. Replace the DY connector at the CN301_5, CN400, CN401 and CN402 connectors on the Main PCB.
5. Replace the connector between CN_Tilt. on the Main PCB and the Tilt Coil.
6. Replace all easily accessible ground wires on the CRT GND Assembly and Bottom Chassis.
7. Replace the Degaussing Coil at CN600 on the Main PCB.
8. Replace the Anode Cap.

4-4-3 Replacing Connector CN103 on the Video PCB

1. Position the Video Shield and replace all screws.
2. Replace 4 point both and back screws on the lower edge of the Video PCB Ass'y and the screw on the signal connector.

4-4-4 Replacing the CRT Socket PCB

1. Hold the CRT Socket PCB Ass'y while you lift the Cap on the CRT Socket and replace the Focus wire, G2 wire.
2. Reconnect the CRT Socket on the CRT pins at the plug / Socket junction.

4-4-5 Cabinet Reassembly

1. Reconnection CN103 both the CRT and the Video PCB.
2. Solder 1 point CRT PCB and replace 1 screw Video shield.
3. Replace the 4 screws on the Bottom Cover.
4. Position the Rear Cover making sure that the tabs along the front edge are properly snapped in place. Replace the 4 screws.
5. Replace the signal cable cover cap.
6. Set the monitor on its Base and make sure that the CRT faceplate was not scratched or otherwise damaged.

5 Alignment and Adjustments

This section of the service manual explains how to make permanent adjustments to the monitor. Directions are given for adjustments using the monitor Interface Board Ver. 2.0 and software (SoftJig).

5-1 Adjustment Conditions

Caution: Changes made without the SoftJig are saved only to the user mode settings. As such, the settings are not permanently stored and may be inadvertently deleted by the user.

5-1-1 Before Making Adjustments

5-1-1 (a) ORIENTATION

When servicing, always face the monitor to the east.

5-1-1 (b) MAGNETIC FIELDS

Whenever possible, use magnetic field isolation equipment such as a Helmholtz field to surround the monitor. If a Helmholtz field is not available, frequently degauss the unit under test.

Caution: Other electrical equipment may cause external magnetic fields which may interfere with monitor performance.

Use an external degaussing coil to limit magnetic build up on the monitor. If an external degaussing coil is not available, use the internal degaussing circuit. However, do not use the internal degaussing circuit more than once per 30 minutes.

5-1-1 (c) WARM-UP TIME

The monitor must be on for 30 minutes before starting alignment. Warm-up time is especially critical in color temperature and white balance adjustments.

5-1-1 (d) SIGNAL

Analog, 0.714 Vp-p positive at 75 ohm, internal termination
Sync: Separate
(TTL level negative / positive)

5-1-1 (e) SCANNING FREQUENCY

Horizontal: 30 kHz to 70 kHz (Automatic)
Vertical: 50 Hz to 120 Hz (Automatic)

Unless otherwise specified, adjust at the 17": 1024 x 768 mode (68 kHz / 85 Hz), 15": 800 x 600 mode (54 kHz / 85 Hz) signals.

Refer to Table 2-1 on pages 2-4 and 2-5.

5-1-1 (f) HIGH VOLTAGE ADJUSTMENT

Signal: No signal
Display image: Self raster
Contrast: Maximum
Brightness: Maximum
Limit: 26 kV ± 0.2 kV (17")
25 kV ± 0.2 kV (15")

Measure the hight voltage level at the anode cap. High voltage should be within the limit as above. If the high voltage needs adjustment use the following procedure.

PROCEDURE

1. Turn the power off and disconnect the AC line cord from the power source.
2. Unsolder and remove VR501 on the Main PCB.
3. Replace VR501 and adjust the high voltage to the specification.
4. Using a soldering iron, melt the adjustment cap on VR501 to prevent any movement.

5-1-1 (g) G2 (SCREEN) VOLTAGE ADJUSTMENT (17" ONLY)

Signal: No signal
Display image: Self raster
Contrast: Maximum
Brightness: Maximum

Adjust the Screen VR of the FBT so that the G2 (Screen) Voltage for SDD CRT is 450 V ± 10 V.

5-1-1 (h) CENTER RASTER

Adjust SW401 so that the back raster comes to the center when you apply a signal of 60 kHz / 75 Hz.

5-1-2 Required Equipment

The following equipment may be necessary for adjustment procedures:

5-1-2 (a) DISPLAY CONTROL ADJUSTMENT

1. Non-metallic (–) screwdriver: 1.5 mm
   Non-metallic (–) screwdriver: 3 mm
2. Philips (+) screwdriver: 1.5 mm
3. Non-metallic hexkey: 2.5 mm
4. Digital Multimeter (DMM), or
   Digital Voltmeter (DVM)
5. Signal generator, or
   Computer with a video board that uses the ET-4000 chipset (strongly recommended if using Samsung DM 200 software) and that displays: 1024 x 768 @ 85 Hz, or 800 x 600 @ 85 Hz (minimum).
6. Personal computer
7. Required software: Softjig.exe from Samsung which includes the cg17e.c data file Samsung DM200, or DisplayMate for Windows from Sonera Technologies
8. Interface Board Ver. 2.0 Code No. BH81-90001K
9. Parallel communications cable (25-pin to 25-pin); Code No. BH81-90001H
10. Signal cable (15-pin to 15-pin cable with additional 3-pin connector); Code No. BH81-90001J
11. 5 V DC adapter, not supplied

Note: SoftJig Ass'y (includes items 8, 9 and 10) Code No. BH81-90001L

5.1-2 (b) COLOR ADJUSTMENTS

1. All equipment listed in 5-1-2 (a), above
2. Color analyzer, or any luminance measurement equipment

5-1-3 Connecting the SoftJig

Connect the monitor to the signal generator and / or PC as illustrated in Figures 5-1 and 5-2.

Note: The signal cable connector which includes the 3-wire cable must connect to the monitor. If you use Setup 2 (PC only, no signal generator) you can only make adjustments to the signal timing available on that computer system. To make corrections to all factory timings requires the use of an additional signal generator.

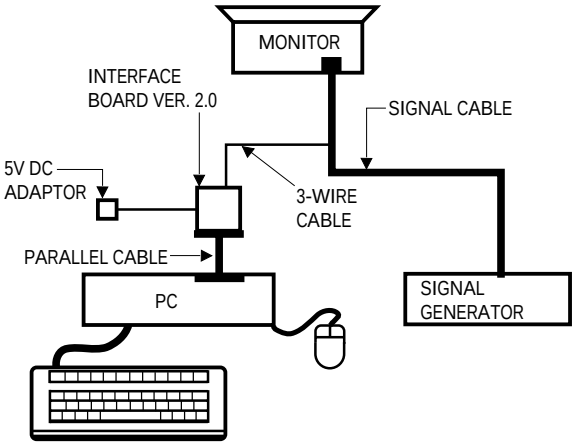


Figure 5-1 : Setup 1, With Signal Generator

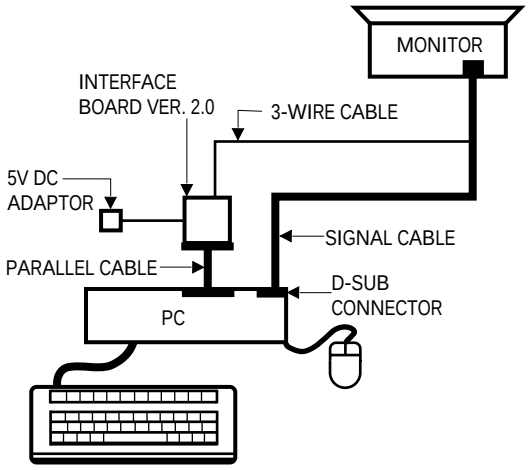


Figure 5-2. Setup 2, Without Signal Generator

5-1-4 After Making Adjustments

After finishing all adjustments, test the monitor in all directions. If, for example, the monitor does not meet adjustment specifications when facing north, reposition the monitor to face east and readjust. This time, try for an adjustment closer to the ideal setting within the tolerance range. Test the unit again in all directions. If the monitor again fails to meet specifications in every direction, contact your Regional After Service Center for possible CRT replacement.

5-2 Display Control Adjustments

5-2-1 Centering

Centering means to position the center point of the display in the middle of the display area. Horizontal size and position and vertical size and position control the centering of the display.

Adjust the horizontal size and vertical size to their optimal settings: 306 mm (H) x 230 mm (V) for 17", 267 mm (H) x 200 mm (V) for 15".

Adjust the horizontal position and vertical position to ≤ 4.0 mm of the center point of the screen.

| A-B | ≤ 4.0 mm.
| C-D | ≤ 4.0 mm.

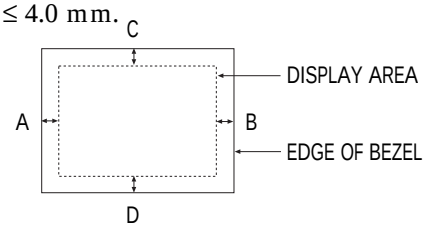


Figure 5-3. Centering

5-2-1 (a) HORIZONTAL SIZE ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz / 85 Hz (17")
	54 kHz / 85 Hz (15")
Display image:	Crosshatch pattern
Brightness:	Maximum
Contrast:	Maximum

Click on the << or >> box next to **B+OUT** to adjust the horizontal size of the display pattern to 306 mm (17") and 267 mm (15"). (Tolerance: ± 3 mm.)

5-2-1 (b) VERTICAL SIZE ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz / 85 Hz (17")
	54 kHz / 85 Hz (15")
Display image:	Crosshatch pattern
Brightness:	Maximum
Contrast:	Maximum

Click on the << or >> box next to **V_SIZE** to adjust the vertical size of the display pattern to 230 mm (17") and 200 mm (15"). (Tolerance: ± 3 mm.)

5-2-1 (c) HORIZONTAL POSITION ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz / 85 Hz (17")
	54 kHz / 85 Hz (15")
Display image:	Crosshatch pattern

Click on the << or >> box next to **H_POSI** to center the horizontal image on the raster.

5-3-1 (d) VERTICAL POSITION ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz / 85 Hz (17")
	54 kHz / 85 Hz (15")
Display image:	Crosshatch pattern

Click on the << or >> box next to **V_POSI** to center the vertical image on the raster.

5-2-2 Linearity

Linearity affects the symmetry of images as they appear on the screen. Unless each row or column of blocks in a crosshatch pattern is of equal size, or within the tolerances shown in Tables 5-2 and 5-3, an image appears distorted, elongated or squashed.

Table 5-1. Standard Modes Linearity: 640x480/75Hz, 800x600/85Hz and 1024x768/85Hz

	Standard Modes Linearity	
	Each block (10 %)	Difference between adjacent blocks (4 %)
4 : 3	Horizontal: 18.2~20.1 Vertical : 18.2~20.1	Horizontal: Less than 0.77 mm Vertical : Less than 0.77 mm
5 : 4	Horizontal: 17.1~18.9 Vertical : 18.2~20.1	Horizontal: Less than 0.72 mm Vertical : Less than 0.77 mm

Table 5-2. Other Modes Linearity: VGA, SVGA, XGA, MAC, etc.

	Supported Timing Mode	
	Each block (14 %)	Difference between adjacent blocks (5 %)
4 : 3	Horizontal: 17.8~20.5 Vertical : 17.8~20.5	Horizontal: Less than 0.96 mm Vertical : Less than 0.96 mm
5 : 4	Horizontal: 16.7~19.2 Vertical : 17.8~20.5	Horizontal: Less than 0.90 mm Vertical : Less than 0.96 mm

5-2-2 (a) HORIZONTAL LINEARITY ADJUSTMENT

The CKB5237L/7227L monitors offer only Vertical Linearity adjustments. Horizontal Linearity is fixed on the Chassis and is not adjustable.

5-2-2 (b) VERTICAL LINEARITY ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz/85 Hz (17”)
	54 kHz/85 Hz (15”)
Display image:	Crosshatch pattern
Brightness:	Maximum
Contrast:	Maximum

To adjust the Vertical Linearity, refer to Tables 5-2 and 5-3 for the tolerance range.

Click on the << or >> box next to **V_LIN** to optimize the image.

5-2-3 Trapezoid Adjustment

CONDITIONS

Scanning frequency:	68 kHz/85 Hz (17”)
	54 kHz/85 Hz (15”)
Display image:	Crosshatch pattern
Brightness:	Maximum
Contrast:	Maximum

Click on the << or >> box next to **TRAPE** to make the image area rectangular.

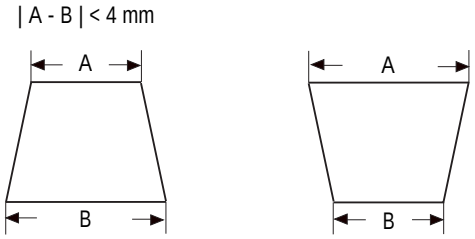


Figure 5-4. Trapezoid

5-2-4 Pinbalance Adjustment

CONDITIONS

Scanning frequency:	68 kHz/85 Hz (17”)
	54 kHz/85 Hz (15”)
Display image:	Crosshatch pattern
Brightness:	Maximum
Contrast:	Maximum

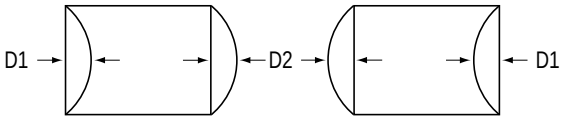


Figure 5-5. Pinbalance

Click on the << or >> box next to **PIN_BAL** to optimize the image.

5-2-5 Parallelogram Adjustment

CONDITIONS

Scanning Frequency:	68 kHz/85 Hz (17”)
	54 kHz/85 Hz (15”)
Display image:	Crosshatch pattern
Brightness:	Maximum
Contrast:	Maximum

Click on the << or >> box next to **PARALL** to make the image area rectangular.

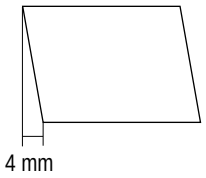


Figure 5-6. Parallelogram

5-2-6 Side Pincushion Adjustment

CONDITIONS

Scanning frequency:	68 kHz / 85 Hz (17”)
	54 kHz / 85 Hz (15”)
Display image:	Crosshatch pattern

Click on the << or >> box next to **BARREL** to straighten the sides of the image area.

| C1 |, | C2 | ≤ 2.0 mm, | D1 |, | D2 | ≤ 2.0 mm.

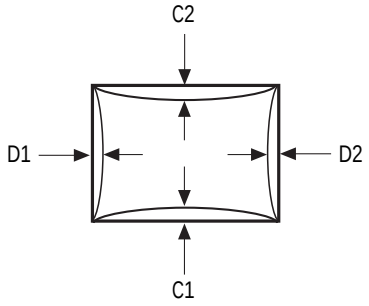


Figure 5-7. Pincushion

5-2-7 Tilt Adjustment

CONDITIONS

Scanning Frequency:	68 kHz / 85 Hz (17”)
	54 kHz / 85 Hz (15”)
Display image:	Crosshatch pattern
Brightness:	Maximum
Contrast:	Maximum

Click on the << or >> box next to **ROTATE** to correct the tilt of the display.

5-2-8 Degauss

No adjustments are available for the degaussing circuit. The degaussing circuit can effectively function only once per 30 minutes.

5-2-9 To Delete the User Mode Data

To delete the adjustment data from the user modes, click **USER DELETE.**

5-2-10 Save the Data

To save the adjustment data for a mode, press **FACTORY SAVE**.

5-3 Color Adjustments

5-3-1 Color Coordinates (Temperature)

Color temperature is a measurement of the radiant energy transmitted by a color. For computer monitors, the color temperature refers to the radiant energy transmitted by white. Color coordinates are the X and Y coordinates on the chromaticity diagram of wavelengths for the visible spectrum.

CONDITIONS

Measurement instrument:	Color analyzer
Scanning frequency:	68 kHz/85 Hz (17”)
	54 kHz/85 Hz (15”)
Display image:	White flat field at center of display area
Luminance:	Maximum

PROCEDURE

Use the directions in sections 5-4-2 through 5-4-3 to adjust the color coordinates for:
9300K to x = 0.283 ± 0.02, y = 0.298 ± 0.02
6500K to x = 0.313 ± 0.02, y = 0.329 ± 0.02

5-3-2 Color Adjustments for 9300K

5-3-2 (a) BACK RASTER COLOR ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz/85 Hz (17”)
	54 kHz/85 Hz (15”)
Display image:	Back raster pattern
Brightness:	Maximum
Contrast:	Maximum

(for 17”)

1. Select **COLOR CHANNEL 1** to control the color for 9300K.
2. Adjust the luminance of the back raster to between 0.5 to 0.7 ft-L using the **G_CUT** controls.
3. Click on the << or >> box next to **B_CUT** to set the “y” coordinate to 0.298 ± 0.02.
4. Click on the << or >> box next to **R_CUT** to set the “x” coordinate to 0.283 ± 0.02.

(for 15”)

1. Select **COLOR CHANNEL 1** to control the color for 9300K.
2. Adjust the luminance of the back raster to between 0.5 to 0.7 ft-L using the **Screen VR (T501)** controls.
3. Click on the << or >> box next to **B_CUT** to set the “y” coordinate to 0.298 ± 0.02.
4. Click on the << or >> box next to **R_CUT** to set the “x” coordinate to 0.283 ± 0.02.

Note: If the above adjustments cannot be done to each coordinate, click on the << or >> box next to **G_CUT** to decrease or increase the green cutoff (bias) and repeat procedures 3 and 4.

5-3-2 (b) G-GAIN ADJUSTMENT

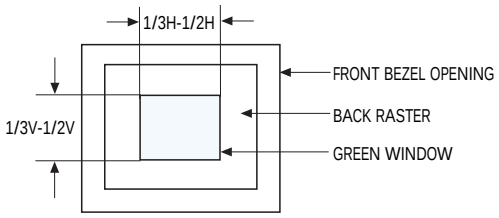


Figure 5-8. Green Box Pattern

CONDITIONS

Scanning frequency:	68 kHz/85 Hz (17”)
	54 kHz/85 Hz (15”)
Display image:	Green box pattern
Brightness:	Maximum
Contrast:	Maximum

1. Click on the << or >> box next to **G_GAIN** to adjust the brightness of the Green Gain to 40 ± 1 ft-L.

Note: If you can’t increase the Green Gain to the appropriate value, click on the >> box next to increase the **ABL** point.

5-3-2 (c) WHITE BALANCE ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz/85 Hz (17”)
	54 kHz/85 Hz (15”)
Display image:	Full white pattern
Brightness:	Maximum
Contrast:	Maximum

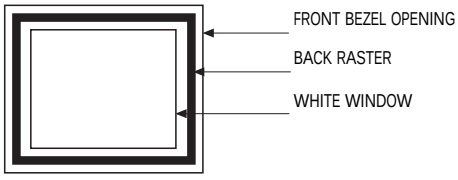


Figure 5-9. Full White Pattern

1. Click on the << or >> boxes next to **R_GAIN** and **B_GAIN** to make the video white. (For 9300K color adjustment: x = 0.283 ± 0.02, y = 0.298 ± 0.02.)

   Note: Do not touch the **G_GAIN** controls.

2. Check the ABL. If it is not within the specifications (35 ± 1 ft-L), use the ABL controls to adjust it.
3. Select **COLOR FACTORY SAVE** to save the data.
4. Select **ALL MODE SAVE** to save the CH2.

5-3-2 (d) WHITE BALANCE ADJUSTMENT VERIFICATION

CONDITIONS

Scanning frequency:	68 kHz / 85 Hz (17”)
	54 kHz / 85 Hz (15”)
Display image:	Back raster pattern
X-Y Coordinates:	x = 0.283 ± 0.02,
	y = 0.298 ± 0.02
ABL Luminance	35 ± 1 ft-L
Brightness:	Maximum
Contrast:	Maximum

1. Check whether the color coordinates of the back raster satisfy the above spec.

   If they do not, return to 5-3-2 (a) and readjust all settings.

2. Display a full white pattern.

Note: Do not touch the **G_GAIN** controls.

3. Adjust the Contrast Control on the monitor so that the luminance of the video is about 5 ft-L.
4. Check whether the white coordinates of the video meet the above coordinates spec.
5. Adjust the Contrast Control again so that the luminance of the video is about 24 ft-L.
6. Check whether the white coordinates of the video satisfies the above spec.

   If they do not, return to 5-3-2 (a) and readjust all settings.

5-3-3 Color Adjustments for 6500K

5-3-3 (a) BACK RASTER COLOR ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz / 85 Hz (17”)
	54 kHz / 85 Hz (15”)
Display image:	Back raster pattern
Brightness:	Maximum
Contrast:	Maximum

(for 17”)

1. Select **COLOR CHANNEL 2** to control the color for 6500K.
2. Adjust the luminance of the back raster to between 0.5 to 1.0 ft-L using the **Screen VR (T501)** controls.

Note: For 6500K adjustments you must not change the Screen VR of the FBT. To do so changes the 9300K setting values.

3. Click on the << or >> boxes next to **R_CUT** and **B_CUT** to adjust the R-Bias to x = 0.313 ± 0.02 and the B-Bias to y = 0.329 ± 0.02.

(for 15”)

1. Select **COLOR CHANNEL 2** to control the color for 6500K.
2. Adjust the luminance of the back raster to between 0.5 to 1.0 ft-L using the **G_CUT** controls.

Note: For 6500K adjustments you must not change the Screen VR of the FBT. To do so changes the 9300K setting values.

3. Click on the << or >> boxes next to **R_CUT** and **B_CUT** to adjust the R-Bias to x = 0.313 ± 0.02 and the B-Bias to y = 0.329 ± 0.02.

5-3-3 (b) G-GAIN ADJUSTMENT

This procedure is the same as that for 9300K, refer to the procedure on page 5-8.

5-3-3 (c) WHITE BALANCE ADJUSTMENT

CONDITIONS

Scanning frequency:	68 kHz / 85 Hz (17”)
	54 kHz / 85 Hz (15”)
Display image:	Full white pattern
Brightness:	Maximum
Contrast:	Maximum

1. Click on the << or >> boxes next to **R_GAIN** and **B_GAIN** to make the video white. (For 6500K color adjustment: x = 0.313 ± 0.02, y = 0.329 ± 0.02.)
2. Refer to the procedure for 9300K, section 5-3-2 (c) steps 2 and 3.

5-3-3 (d) WHITE BALANCE ADJUSTMENT VERIFICATION

Refer to the procedure for 9300K, section 5-3-2 (d).

5-3-4 Luminance Uniformity Check

Luminance is considered uniform only if the ratio of lowest to highest brightness areas on the screen is not less than 7.5:10.

CONDITIONS

Scanning frequency:	68 kHz/85 Hz (17”) 54 kHz/85 Hz (15”) (1024 x 768)
Display image:	White flat field
Brightness:	Cut off point at 24 ft-L
Contrast:	Maximum

PROCEDURE

Measure luminance at nine points on the display screen (see figure below).

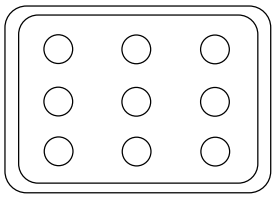


Figure 5-10. Luminance Uniformity Check Locations

5-3-5 Focus Adjustment

CONDITIONS

Scanning frequency:	68 kHz/85 Hz (17”) 54 kHz/85 Hz (15”) (1024 x 768)
Display image:	“H” character pattern
Brightness:	Cut off point
Contrast:	Maximum

PROCEDURE

1. Adjust the Focus VR on the FBT to display the sharpest image possible.
2. Use Locktite to seal the Focus VR in position.

5-3-6 Color Purity Adjustment

Color purity is the absence of undesired color. Conspicuous mislanding (unexpected color in a uniform field) within the display area shall not be visible at a distance of 50 cm from the CRT surface.

CONDITIONS

Orientation:	Monitor facing east
Scanning frequency:	68 kHz/85 Hz (17”) 54 kHz/85 Hz (15”)
Display image:	White flat field
Luminance:	Cut off point at the center of the display area

Note: Color purity adjustments should only be attempted by qualified personnel.

PROCEDURE

For trained and experienced service technicians only.

Use the following procedure to correct minor color purity problems:

1. Make sure the display is not affected by external magnetic fields.
2. Very carefully break the glue seal between the 2-pole purity convergence magnets (PCM), the band and the spacer (see Figures 5-12).
3. Make sure the spacing between the PCM assembly and the CRT stem is 29 mm ± 1 mm.
4. Display a green pattern over the entire display area.
5. Adjust the purity magnet rings on the PCM assembly to display a pure green pattern. (Optimum setting: x = 0.295 ± 0.015, y = 0.594 ± 0.015)
6. Repeat steps 4 and 5 using a red pattern and then again, using a blue pattern.

Table 5-3. Color Purity Tolerances

Red:	x = 0.640 ± 0.015	y = 0.323 ± 0.015
Green:	x = 0.295 ± 0.015	y = 0.594 ± 0.015
Blue:	x = 0.142 ± 0.015	y = 0.066 ± 0.015

(For 9300K color adjustment: x = 0.283 ± 0.02, y = 0.298 ± 0.02)

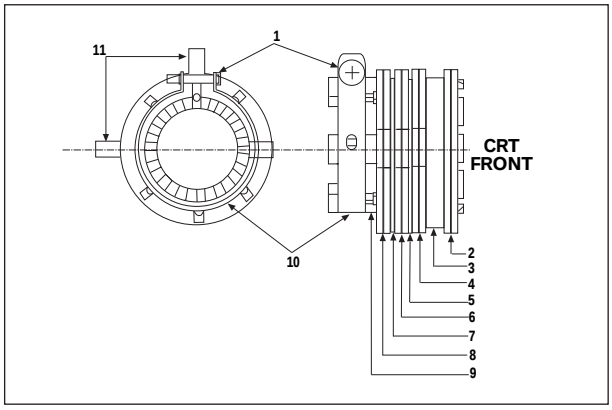
7. When you have the PCMs properly adjusted, carefully glue them together to prevent their movement during shipping.

5-4 Convergence Adjustments

Misconvergence occurs when one or more of the electron beams in a multibeam CRT fail to meet the other beams at a specified point.

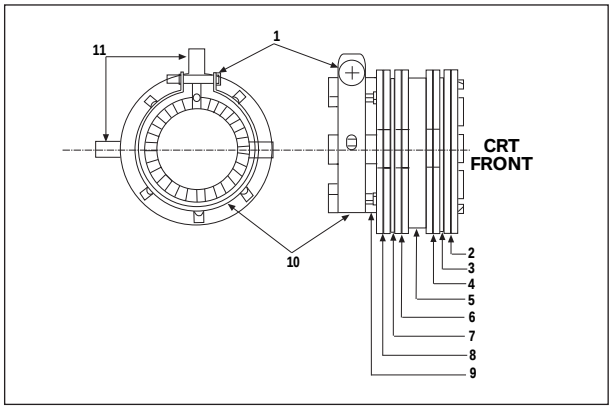
Table 5-4. Misconvergence Tolerances

Position	Error in mm	CRT Dot Pitch
Center (A)	0.30	0.28
Edge (B)	0.40	0.28



Samsung SDD CRT			
1 Setup Bolt	2 Bow Magnet	3 Band	4 2-Pole Magnet
5 Spacer	6 4-Pole Magnet	7 Spacer	8 6-Pole Magnet
9 Holder	10 Band	11 Tabs	

Figure 5-11. Magnet Configuration



Toshiba CRT			
1 Setup Bolt	2 Bow Magnet	3 Spacer	4 2-Pole Magnet
5 Band	6 6-Pole Magnet	7 Spacer	8 4-Pole Magnet
9 Holder	10 Band	11 Tabs	

Figure 5-12. Toshiba Magnet Configuration

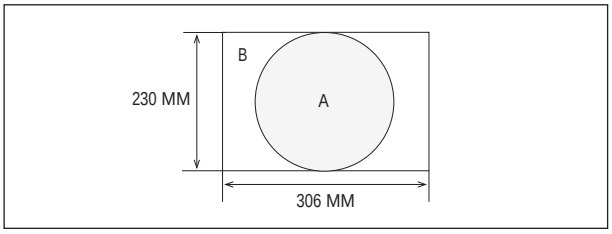


Figure 5-13. Convergence Measurement Areas

5-4-1 Static (Center) Convergence

Static convergence involves alignment of the red, blue and green lines in the center area of the display. See “Dynamic Convergence” for alignment of the color fields around the edges of the display.

CONDITIONS

Direction: Monitor facing east
Warm-up: 30 minutes
Display image: Crosshatch pattern
Tolerances: See Table 5-4

PROCEDURE

As shown in Figure 5-11, the CRT used in these monitors has the same magnet configuration as shown in Table 5-5 below.

Table 5-5. Magnet Order

CRT Manufacturer	Magnet Order from Front of CRT
SDD	Convergence bow, 2-pole, 4-pole, 6-pole
Toshiba	Convergence bow, 2-pole, 6-pole, 4-pole

Use the following steps to correct any static misconvergence:

1. Make sure the display is not affected by external magnetic fields.
2. Locate the pair of 4-pole magnet rings.
3. Unlock the rings and rotate the individual rings (change the spacing between tabs) to converge the vertical red and blue lines.
4. Rotate the pair of rings (maintaining the spacing between tabs) to converge the horizontal red and blue lines.

5. After completing the red and blue center convergence adjustment, locate the pair of 6-pole magnet rings.
6. Rotate the individual rings (change the spacing between tabs) to converge the vertical red and blue (magenta) and green lines.
7. Rotate the pair of rings (maintaining the spacing between tabs) to converge the horizontal red and blue (magenta) and green lines. Don't rotate the 2-pole magnets as they adjust for color purity.
8. Mark the correct position for the magnets and apply a small line of glue to hold the magnets in place. Lock the rings in place.

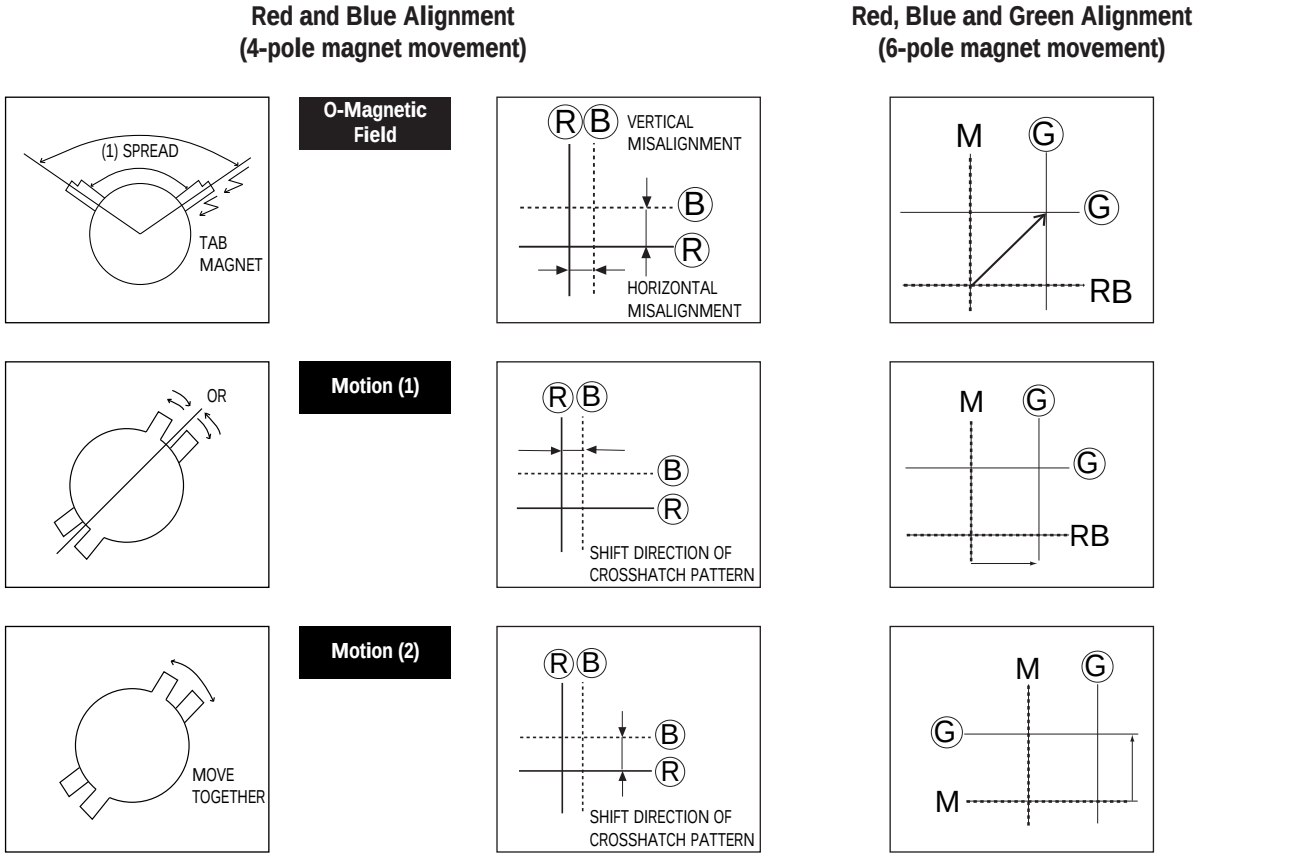
5-4-2 Dynamic (Edge) Convergence

Use the following procedure to correct minor dynamic (edge) misconvergence. If, after using this procedure, dynamic misconvergence around the periphery of the display area is still greater than the tolerance, contact the Regional After Service Center for possible CRT replacement.

1. Make sure the display is not affected by external magnetic fields.
2. Make sure the static convergence is properly adjusted.
3. Strategically place small rubber magnets on the back of the CRT to correct the misconvergence. Be careful not to remove the paper protecting the adhesive on the magnets until you are satisfied with their placement and the dynamic convergence.
4. When you are satisfied with the convergence around the edge of the CRT, permanently glue the magnets to the back of the CRT.

WARNING: Do not remove or change the position of the factory installed wedges. These wedges were installed by the CRT manufacturer and are properly placed for this CRT; their removal may result in damage to the CRT.

Figure 5-14. Magnet Movements



5-4-3 Bow Convergence Adjustments

CONDITIONS

Orientation: Monitor facing east.
Display Image: Crosshatch pattern with mixed RGB colors.
Required tools: Flat-head (–) screwdriver, 1.5 mm
Philips (+) screwdriver, 1.5 mm
Hexkey, 2.5 mm

PROCEDURE

Bow convergence adjustments are not available for the CRTs used in the CKB5237L / 7227L monitors. While all CRTs have bow convergence magnets, they are sealed in the CRT factory and are not user or service technician adjustable. Do not touch these magnets (see Figures 5-12 and 5-13). If bow convergence adjustment is out of alignment, replace the CRT.

Bow misconvergence should not exceed the values listed in Table 5-5: Misconvergence Tolerances.

5-4-4 Balance Convergence Adjustments

Balance Convergence involves alignment of red and blue lines when they are misaligned at one end more so than at the other end. The Deflection Yoke holds the balance coils which can correct balance misconvergences.

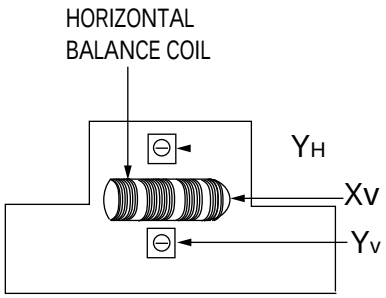


Figure 5-15. SDD Deflection Yoke

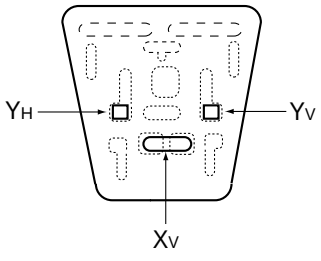


Figure 5-16. Toshiba Deflection Yoke

5-4-4 (a) HORIZONTAL LINE RED AND BLUE BALANCE CONVERGENCE

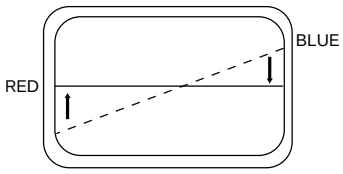


Figure 5-17. Horizontal Line Balance Misconvergence

Use a 2.5 mm hexkey at the Horizontal Balance Coil (XV). Turning it right raises the right end of the blue line and lowers the left end. Turning the VR to the left lowers the right end of the blue line and raises the left end.

5-4-4 (b) VERTICAL RED AND BLUE BALANCE CONVERGENCE

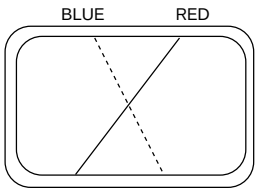


Figure 5-18. Vertical Line Balance Misconvergence

Use a 1.5 mm screwdriver (flat-head [–] for SDD DYs and phillips type [+] for Toshiba DYs) at the YH variable register. Turning the VR left tilts the blue line to the right. Turning it right tilts the blue line to the left.

5-4-4 (c) UPPER AND LOWER HORIZONTAL LINE CONVERGENCE

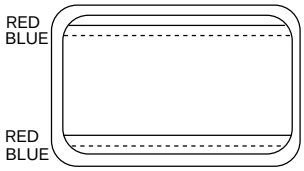


Figure 5-19. Upper and Lower Balance Misconvergence

Use a 1.5 mm screwdriver (flat-head [–] for SDD DYs and phillips type [+] for Toshiba DYs) at the Yv variable register. Turning the VR to the left moves the blue line at the top upward and at the bottom, the line moves downward. Turning it right moves the blue line at the top downward and at the bottom, the line moves upward.

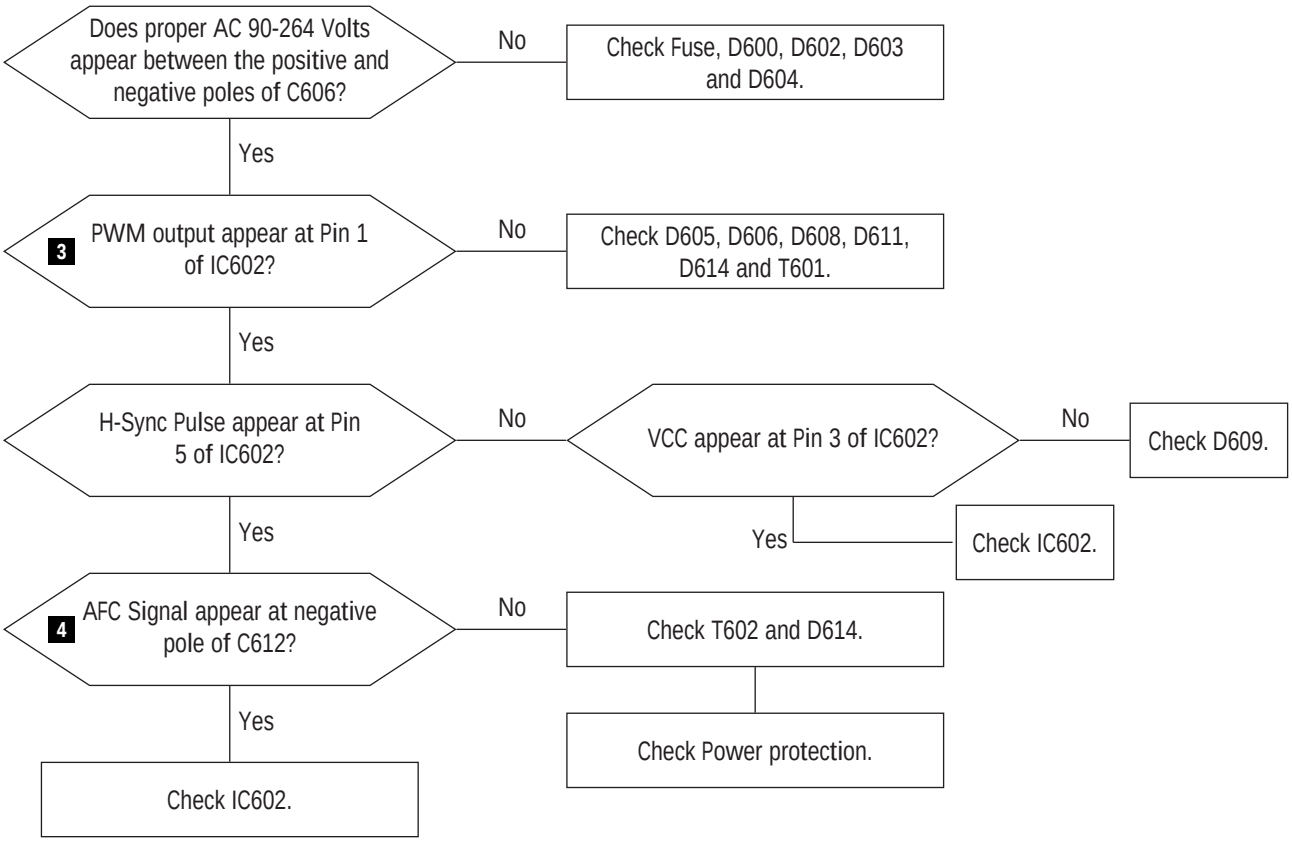
Memo

6 Troubleshooting

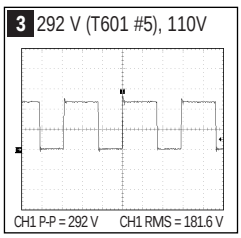
Notes: 1. If a picture does not appear, fully rotate the brightness and contrast controls clockwise and reinspect.

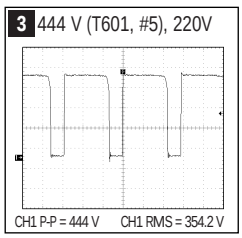
2. Check the following circuits.
   - No raster appears: Power circuit,Horizontal output circuit, H/V control circuit, and H/V output circuit.
   - High voltage develops but no raster appears: Video output circuits.
   - High voltage does not develop: Horizontal output circuits.

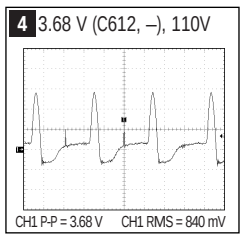
6-1 No Power

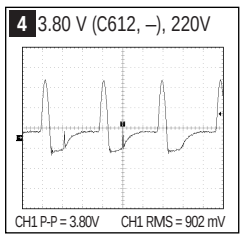


WAVEFORMS

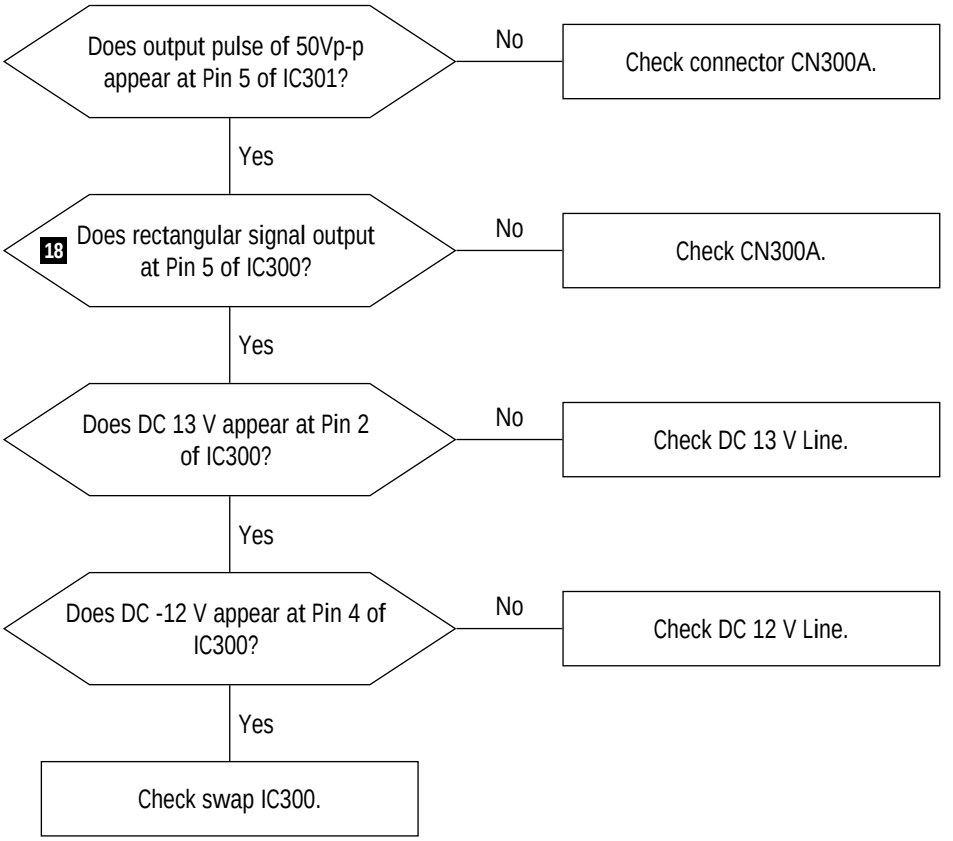




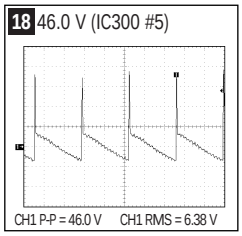




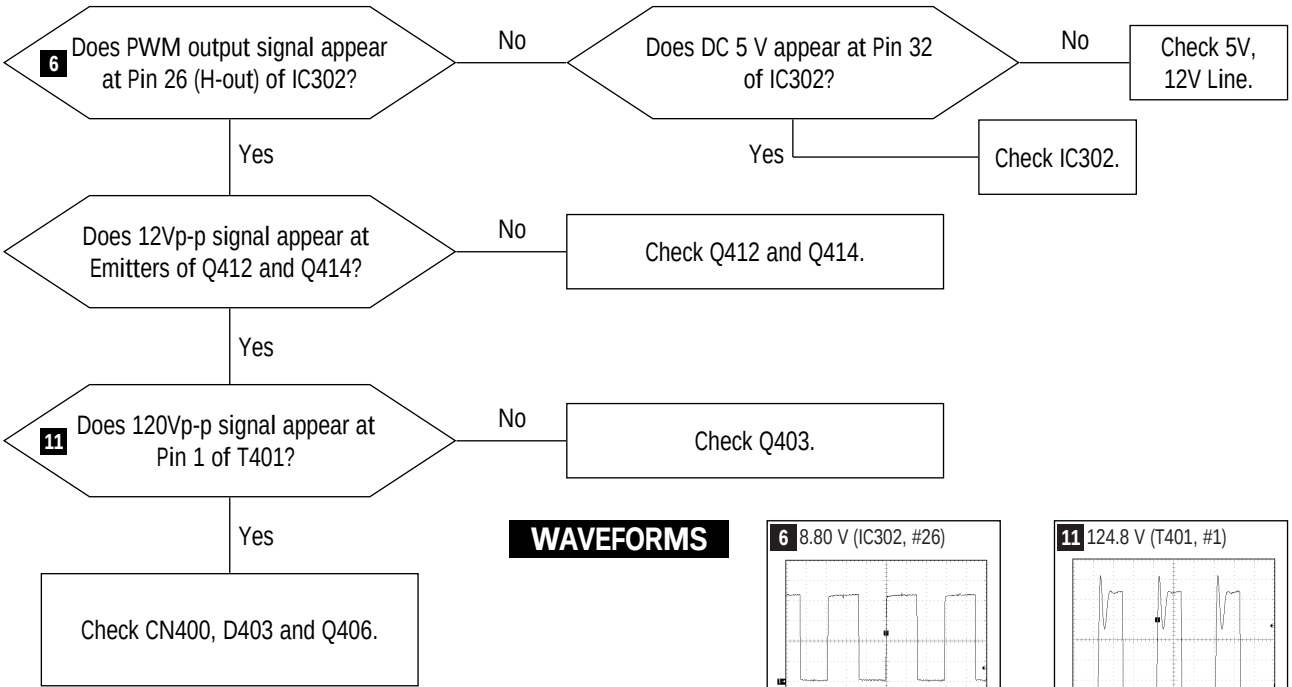
6-2 Horizontal Line on CRT (Root Cause : Vertical Deflection Parts Fail)



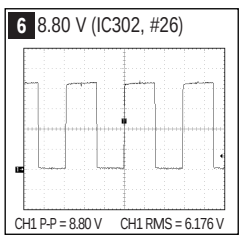
WAVEFORMS

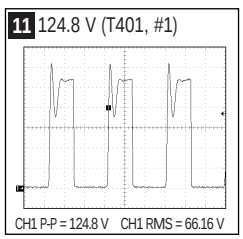


6-3 Vertical Line on CRT (Root Cause : Horizontal Deflection Parts Fail)



WAVEFORMS





6-4 No Raster (1)

If in a protection case, you must check these case
- Check CN401
- Check Screen VR
- Check VR501

Does secondary voltage appear at D605, D606, D608, D611 and D614?
- No → Check Power parts.
- Yes ↓

Does DC 5 V appear at Pin 12 of IC202?
- No → Check protection case.
- Yes ↓

6 Does H-out signal appear at Pin 26 of IC302?
- No → Does DC +5 V, DC +12 V appear at Pins 29, and 32 of IC302?
  - No → Check IC600 and IC603.
  - Yes → Check IC302.
- Yes ↓

Does signal appear at base of Q403?
- No → Check Q412 and Q414.
- Yes ↓

Does signal appear at collector of Q403?
- No → Check Q403.
- Yes ↓

14 Does flyback signal appear at collector of Q406?
- No → Check Q406.
- Yes ↓

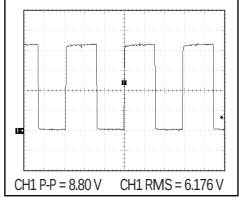
22 23 Does switching pulse appear at base and collector of Q503?
- No → Check Q503, Q510, Q512 and Q513.
- Yes ↓

Does signal appear at gate of Q504 ?
- No → Check IC501 and FBT.
- Yes ↓

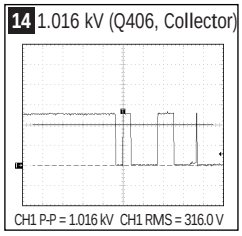
Check Q504, D508 and FBT.

WAVEFORMS

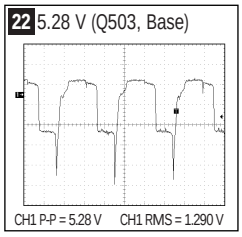
6 8.80 V (IC302, #26)



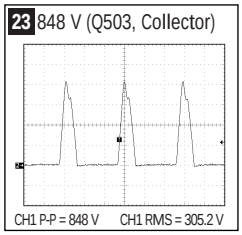
14 1.016 kV (Q406, Collector)



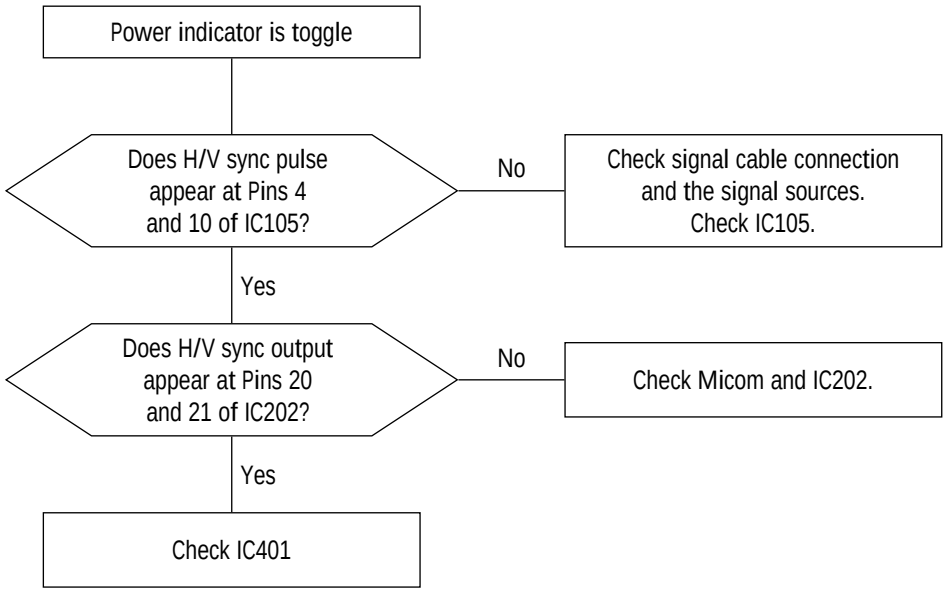
22 5.28 V (Q503, Base)



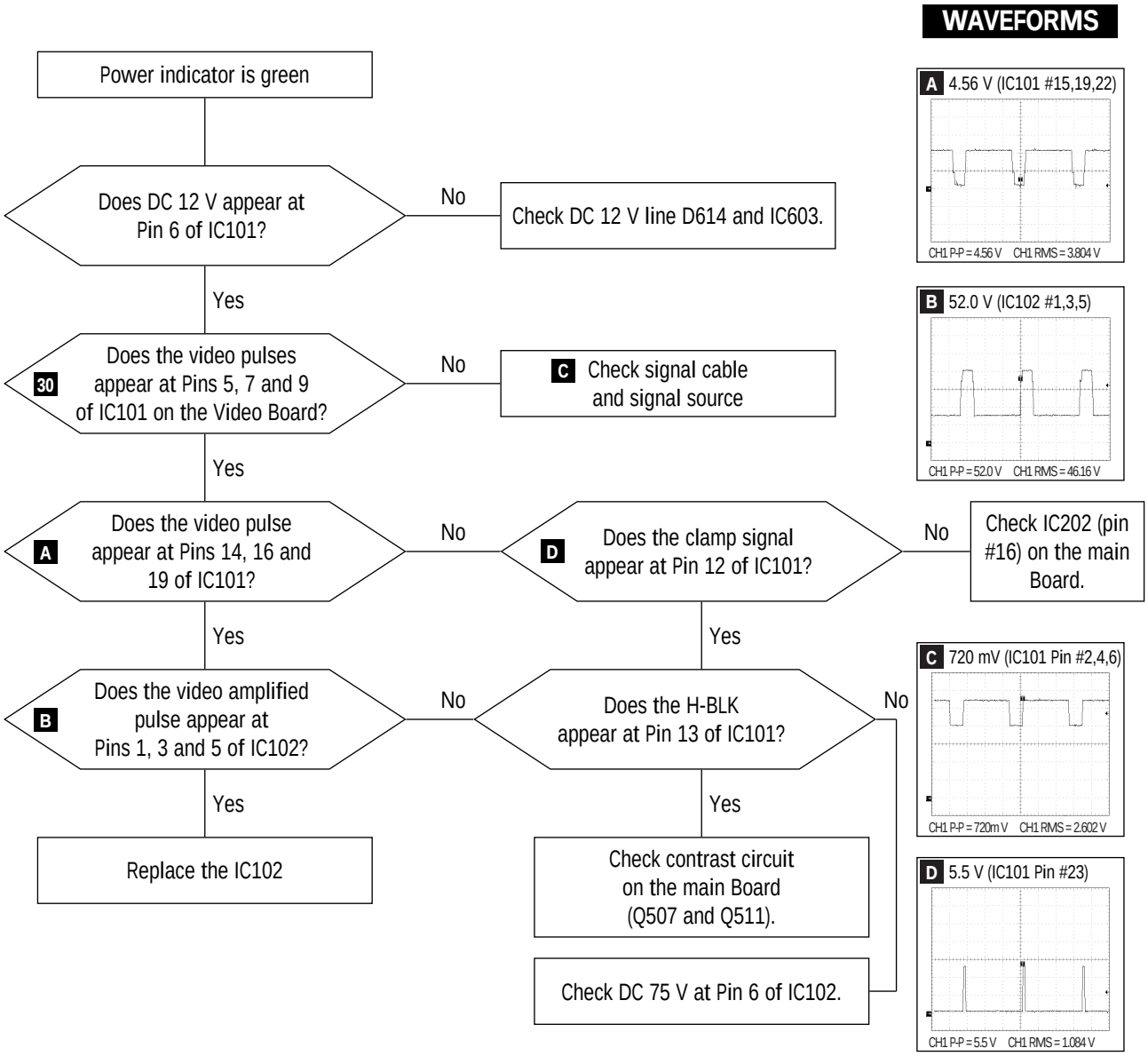
23 848 V (Q503, Collector)



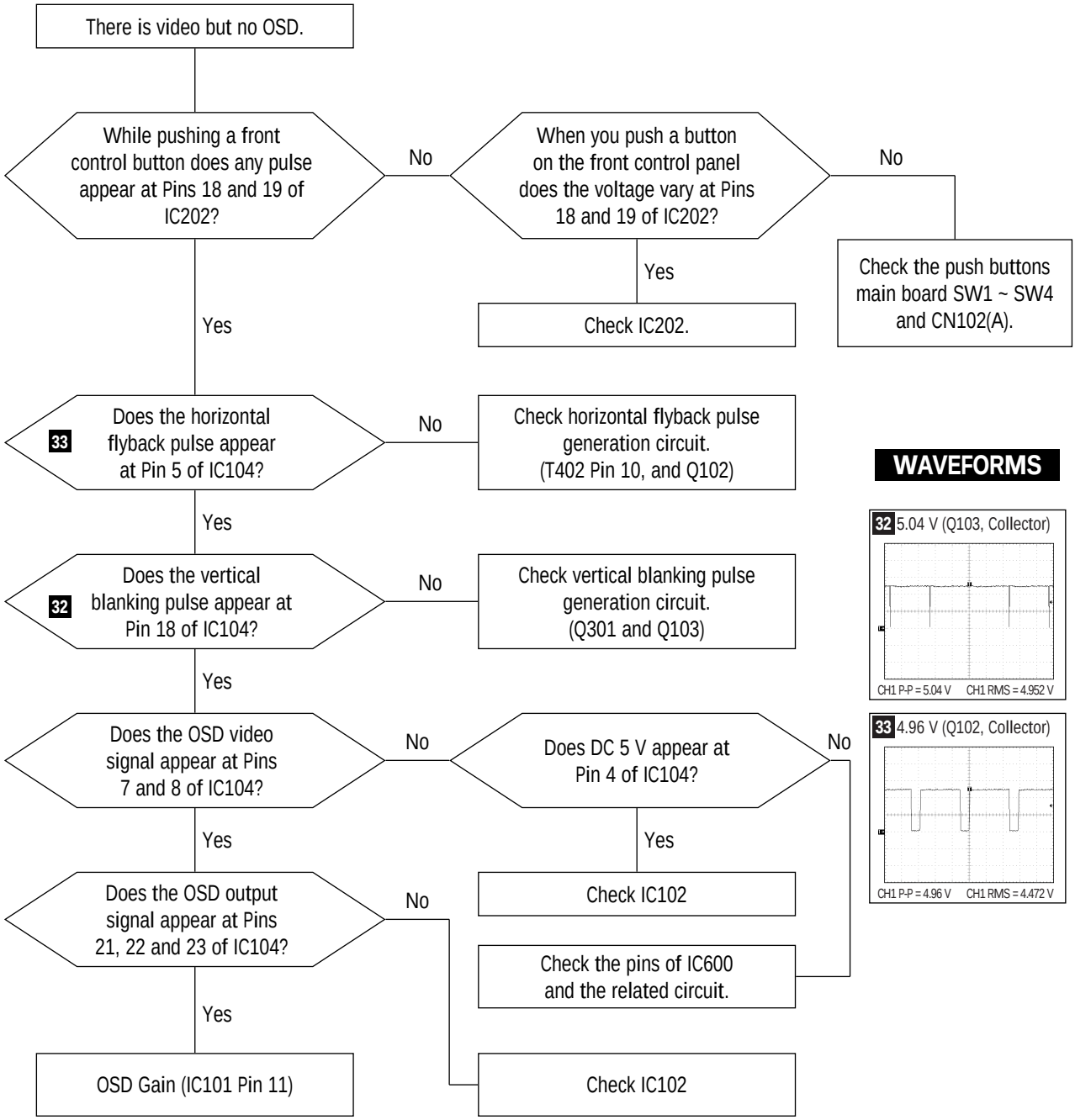
6-5 No Raster (2)


Power indicator is toggle
Does H/V sync pulse appear at Pins 4 and 10 of IC105?
No
Check signal cable connection and the signal sources. Check IC105.
Yes
Does H/V sync output appear at Pins 20 and 21 of IC202?
No
Check Micom and IC202.
Yes
Check IC401

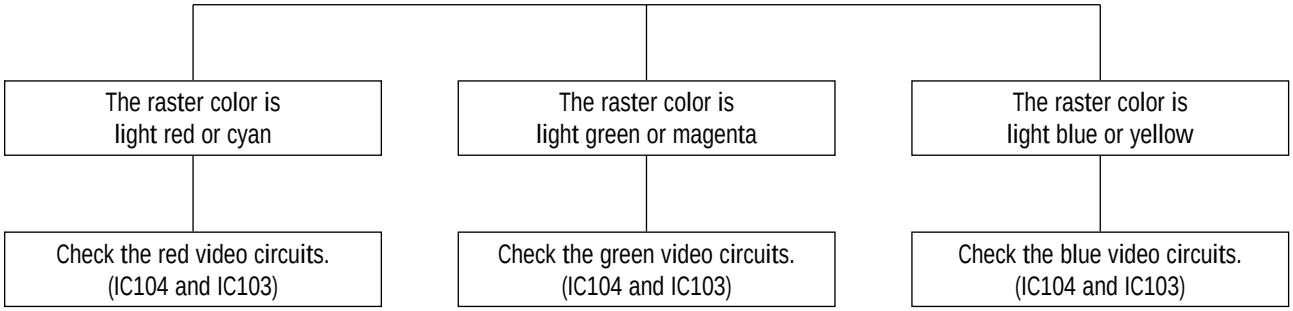
6-6 No Video


Power indicator is green
Does DC 12 V appear at Pin 6 of IC101?
No
Check DC 12 V line D614 and IC603.
Yes
30
Does the video pulses appear at Pins 5, 7 and 9 of IC101 on the Video Board?
No
C
Check signal cable and signal source
Yes
A
Does the video pulse appear at Pins 14, 16 and 19 of IC101?
No
D
Does the clamp signal appear at Pin 12 of IC101?
No
Check IC202 (pin #16) on the main Board.
Yes
Yes
B
Does the video amplified pulse appear at Pins 1, 3 and 5 of IC102?
No
Does the H-BLK appear at Pin 13 of IC101?
No
Yes
Yes
Replace the IC102
Check contrast circuit on the main Board (Q507 and Q511).
Check DC 75 V at Pin 6 of IC102.
WAVEFORMS
A 4.56 V (IC101 #15,19,22)
CH1 P-P = 4.56 V CH1 RMS = 3.804 V
B 52.0 V (IC102 #1,3,5)
CH1 P-P = 52.0 V CH1 RMS = 46.16 V
C 720 mV (IC101 Pin #2,4,6)
CH1 P-P = 720m V CH1 RMS = 2.602 V
D 5.5 V (IC101 Pin #23)
CH1 P-P = 5.5 V CH1 RMS = 1.084 V

6-7 No OSD Displays

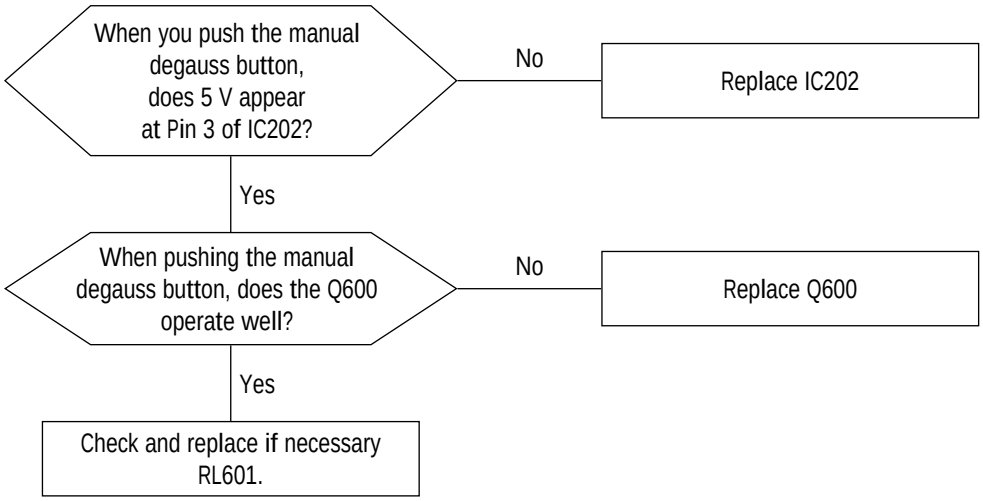

There is video but no OSD.
While pushing a front control button does any pulse appear at Pins 18 and 19 of IC202?
No
When you push a button on the front control panel does the voltage vary at Pins 18 and 19 of IC202?
No
Yes
Check IC202.
Check the push buttons main board SW1 ~ SW4 and CN102(A).
Yes
33
Does the horizontal flyback pulse appear at Pin 5 of IC104?
No
Check horizontal flyback pulse generation circuit. (T402 Pin 10, and Q102)
Yes
32
Does the vertical blanking pulse appear at Pin 18 of IC104?
No
Check vertical blanking pulse generation circuit. (Q301 and Q103)
Yes
Does the OSD video signal appear at Pins 7 and 8 of IC104?
No
Does DC 5 V appear at Pin 4 of IC104?
No
Yes
Check IC102
Check the pins of IC600 and the related circuit.
Yes
Does the OSD output signal appear at Pins 21, 22 and 23 of IC104?
No
Yes
OSD Gain (IC101 Pin 11)
Check IC102
WAVEFORMS
32 5.04 V (Q103, Collector)
CH1 P-P = 5.04 V CH1 RMS = 4.952 V
33 4.96 V (Q102, Collector)
CH1 P-P = 4.96 V CH1 RMS = 4.472 V

6-8 No Specific Color Appears


The raster color is light red or cyan
The raster color is light green or magenta
The raster color is light blue or yellow
Check the red video circuits. (IC104 and IC103)
Check the green video circuits. (IC104 and IC103)
Check the blue video circuits. (IC104 and IC103)

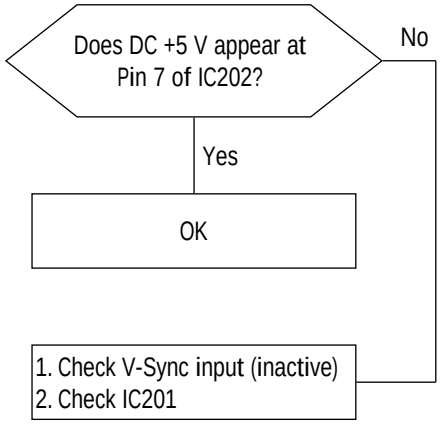
Note: Removing the signal cable displays a self raster screen. This screen displays the message "check signal cable" along with red, green and blue boxes. Use these boxes to check whether each individual color (R, G, B) is operating or not.

6-9 Degauss Operation Failure

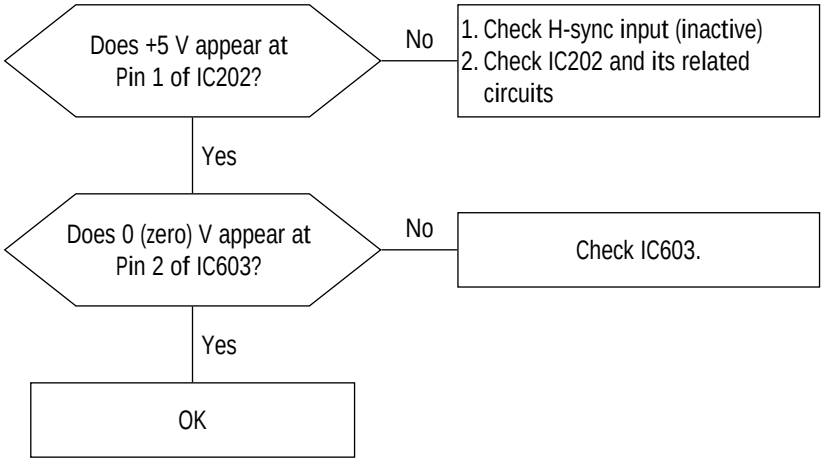

When you push the manual degauss button, does 5 V appear at Pin 3 of IC202?
No
Replace IC202
Yes
When pushing the manual degauss button, does the Q600 operate well?
No
Replace Q600
Yes
Check and replace if necessary RL601.

6-10 Power Save Management System Failure

6-10-1 Stand-By Mode



6-10-2 Suspend Mode



6-10-3 Off Mode

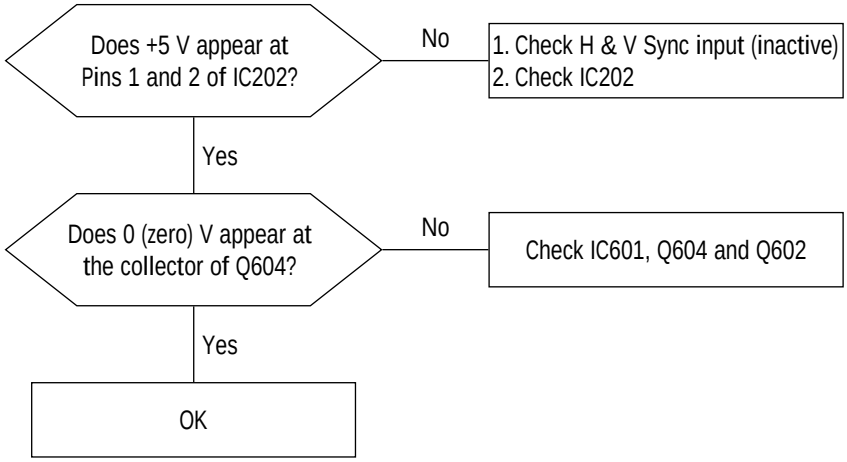
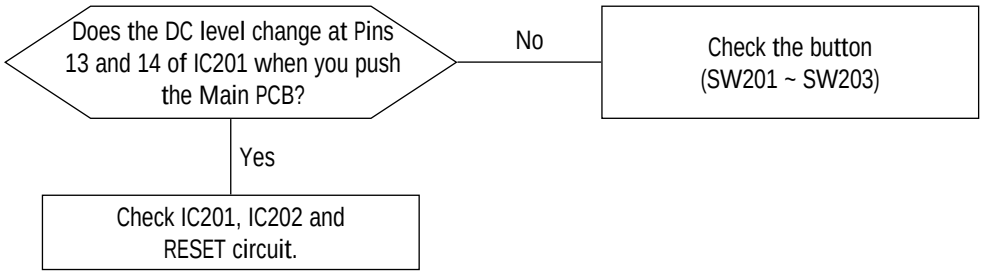

Does +5 V appear at Pins 1 and 2 of IC202?
No
1. Check H & V Sync input (inactive)
2. Check IC202
Yes
Does 0 (zero) V appear at the collector of Q604?
No
Check IC601, Q604 and Q602
Yes
OK

Table 6-1. DPMS Logic Table

Mode	Sync		Video	LED Color
	H	V		
Normal	Active	Active	Active	Green
Stand-By	Inactive	Active	Blank	Green blinking (0.5sec)
Suspend	Active	Inactive	Blank	Green blinking (1sec)
Off	Inactive	Inactive	Blank	blinking (1sec)

Note: If the signal cable is removed, DPMS function does not operate and a self raster displays.

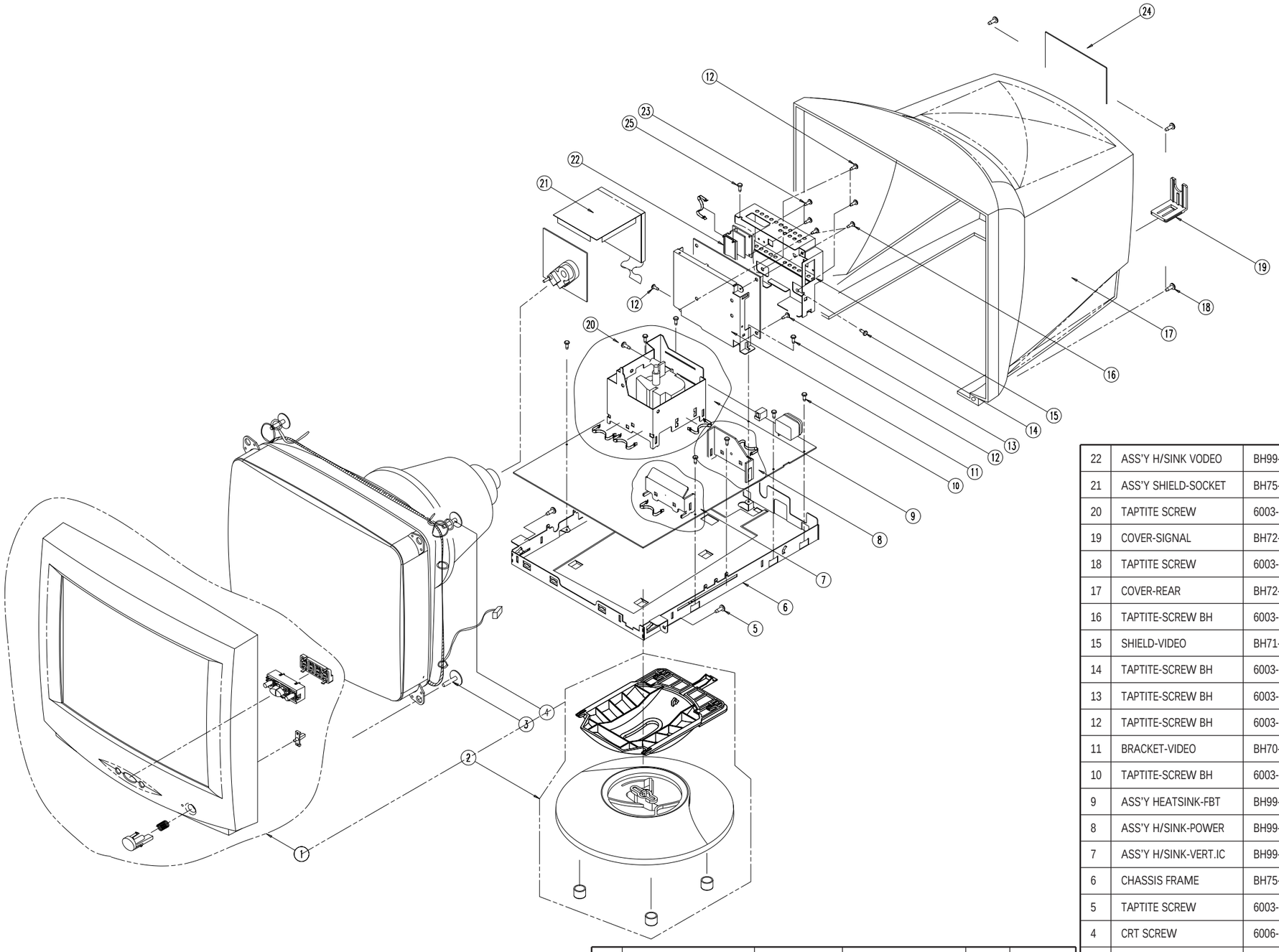
6-11 User Controls Don't Work


Does the DC level change at Pins 13 and 14 of IC201 when you push the Main PCB?
No
Check the button (SW201 ~ SW203)
Yes
Check IC201, IC202 and RESET circuit.

Memo

8 Exploded View and Parts List

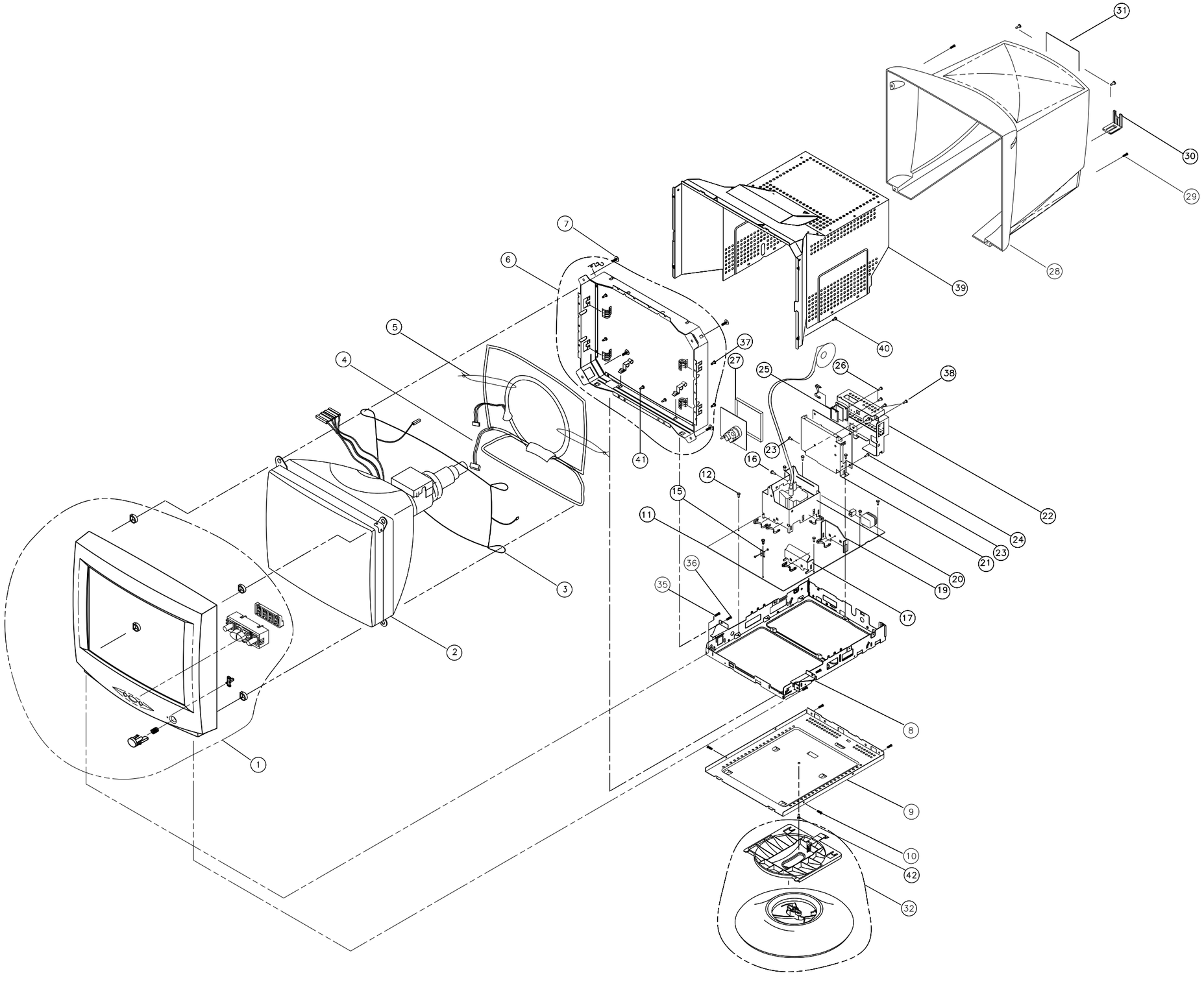
8-1 CKB5237L



NO	DESCRIPTION	CODE NO	SPECIFICATION	Q'TY	REMARK
22	ASS'Y H/SINK VODEO	BH99-10050A	A6063S	1 EA	
21	ASS'Y SHIELD-SOCKET	BH75-10571A	SPTE T=0.3	1 EA	
20	TAPTITE SCREW	6003-000122	BH,M4,L12	1 EA	
19	COVER-SIGNAL	BH72-60603A	ABS V0 IV16	1 EA	
18	TAPTITE SCREW	6003-000009	BH,M4,L16	4 EA	
17	COVER-REAR	BH72-60600A	ABS V0 IV16	1 EA	
16	TAPTITE-SCREW BH	6003-000010	BWH,+,M3,L10	2 EA	
15	SHIELD-VIDEO	BH71-10390B	A1050S T=1.0	1 EA	
14	TAPTITE-SCREW BH	6003-000010	BWH,+,M3,L10	1 EA	S/CABLE
13	TAPTITE-SCREW BH	6003-000010	BWH,+,M3,L10	1 EA	VIDEO+S/V
12	TAPTITE-SCREW BH	6003-000010	BWH,+,M3,L10	4 EA	VIDEO+C/F
11	BRACKET-VIDEO	BH70-10485A	SECC-1 T=0.8	1 EA	
10	TAPTITE-SCREW BH	6003-000010	BWH,+,M3,L10	7 EA	CH/FRAME
9	ASS'Y HEATSINK-FBT	BH99-10048A	A1050S T=1.0	1 EA	D403,Q406
8	ASS'Y H/SINK-POWER	BH99-10013C	A1050S T=3.0	1 EA	IC602
7	ASS'Y H/SINK-VERT.IC	BH99-10049A	A1050S T=2.0	1 EA	IC300
6	CHASSIS FRAME	BH75-10572A	SECC-1 T=1.0	1 EA	
5	TAPTITE SCREW	6003-000009	BH,M4,L16	2 EA	
4	CRT SCREW	6006-000002	D5, L30	2 EA	
3	CRT SCREW	6006-000201	D5, L30	2 EA	
2	STAND-ASS'Y	BH75-10442B	ABS HB IV16	1 EA	
1	ASS'Y, COVER-FRONT	BH75-10552A	ABS V0 IV16	1 EA	
NO	DESCRIPTION	CODE NO	SPECIFICATION	Q'TY	REMARK

NO	DESCRIPTION	CODE NO	SPECIFICATION	Q'TY	REMARK
23	TAPTITE-SCREW BH	6003-000015	BH,+,D3,L8	2 EA	
24	LABEL-RATING		POLYESTER T=0.075	1 EA	
25	TAPTITE-SCREW BH	6003-000010	BWH,+,M3,L10	1 EA	
NO	DESCRIPTION	CODE NO	SPECIFICATION	Q'TY	REMARK

8-2 CKB7227L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NO	DESCRIPTION	CODE-NO	SPECIFICATION	Q'TY	REMARK
1	UNIT-COVER FRONT	BH75-10548L	CKB7227(ABS V0 GR20)	1	
2	17" COLOR CRT		CKB7227	1	
3	ASS'Y CRT-GROWND		TBC WIRE	1	
4	ASS'Y D-COIL		CKB7227	1	
5	BREAD TIE	BH65-10100A	NYLON 6/6	2	
6	UNIT-BRKT ASS'Y	BH75-10422F	CGE7527	1	
7	TAPTITE SCREW-CRT	6006-000197	M5 L20 ZPC3	4	
8	UNIT/BRKT-PCB	BH75-10569A	SECC T1.0	1	
9	BRKT-PCB,BOTTOM	BH70-10484A	SECC T1.0	1	
10	TAPTITE 3X8	6003-000015	M3 L8 ZPC3	4	
11	ASS'Y-MAIN PCB		CKB7227	1	
12	TAPTITE W/W 3X10	6003-000010	M3 L10 ZPC3	7	
15	ASSY,HEAT-SINK TR	BH99-10018C	A1050S T1.0	1	
16	TAPTITE SCREW	6003-000122	BH M4 L12	1	FBT+H/S-FBT
17	ASSY,HEATSINK-VERTICAL IC	BH99-10049A	A1050S T2.0	1	HS300
19	ASSY,HEATSINK-POWER	BH99-10013C	A1050S T3.0	1	HS602
20	ASSY,HEATSINK-FBT	BH99-10048B	A1050S T1.0	1	HS501
21	BRACKET-VIDEO	BH70-10485A	SECC-1 T0.8	1	
22	SHIELD-VIDEO	BH71-10390A	A1050S-H14 T1.0	1	
23	TAPTITE W/W 3X10	6003-000010	BWH,+,M3,L10	3	VIDEO+B/PCB
24	TAPTITE-SCREW BH	6003-000010	BWH,+,M3,L10	1	V/PCB+B/VIDEO
25	ASSY,HEATSINK-VIDEO	BH99-10050A	A6063S	1	HS1

NO	DESCRIPTION	CODE-NO	SPECIFICATION	Q'TY	REMARK
26	TAPTITE W/W 3X10	6003-000010	M3 L10 ZPC3	2	S/V+BRKT/V
27	SHIELD-CRT PCB	BH70-10344D	SPTE T0.3	1	
28	COVER-REAR	BH72-60602A	ABS V0 IV16	1	
29	TAPTITE-SCREW	6003-000009	BH M4 L16	4	
30	COVER-SIGNAL	BH72-60603A	ABS V0 IV16	1	
31	LABEL-RATING	BH68-30573D	POLYESTER T0.075	1	
32	UNIT-STAND ASS'Y	BH75-10463A	CGE7527	1	
35	TAPTITE 4X16	6003-000009	M4 L16 ZPC3	2	B/PCB+C/F
36	TAPTITE 4X12	6003-000122	M4 L12 ZPC3	2	B/PCB+B/CRT
37	TAPTITE 4X16	6003-000009	M4 L16 ZPC3	4	C/F+B-CRT
38	TAPTITE W/W 3X10	6003-000010	M3 L10 ZPC3	2	H/S+SH/V
39	UNIT/SHIELD-TOP	BH75-10551A	A1050S H14 T0.5	1	
40	TAPTITE 3X8	6003-000015	M3 L8 ZPC3	9	S/TOP
41	TAPTITE 4X16	6003-000009	M4 L16 ZPC3	2	C/F+B-CRT
42	TAPTITE 4X12	6003-000122	M4 L12 ZPC3	1	STAND+BRK

Memo

10-1-3 Main PCB Parts

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
BD404	172.4	242.7	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD405	75.3	137.5	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD406	71.7	122	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD411	24.4	141.2	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD413	39.2	123.6	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD415	16.9	206.3	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD416	23	206.2	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD417	41.9	198.2	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD501	158.7	135.6	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD600	187.5	108.7	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD601	139.5	62.5	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD602	197.3	46.9	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD603	152.1	67.1	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD604	308	55.7	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
BD605	294	55.7	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
C200	74.8	24.2	2401-000030	C-AL	22uF,20%,25V,GP,5x11mm,5mm,TP	
C201	74	17.7	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C206	64.2	70.1	2401-000027	CAP-AL.ELEC,475M,1H	(T)50V 4.7M	
C207	64.2	57.4	2401-000027	CAP-AL.ELEC,475M,1H	(T)50V 4.7M	
C208	53.3	81.6	2401-000027	CAP-AL.ELEC,475M,1H	(T)50V 4.7M	
C210	64.2	64	2401-000027	CAP-AL.ELEC,475M,1H	(T)50V 4.7M	
C211	21.4	25.7	2201-000138	C-CERAMIC,DISC	100pF,10%,50V,Y5P,4.0X4.0,2.5	
C212	42.1	31.9	2201-000197	C-CERAMIC,DISC	10pF,0.5pF,50V,NPO,4x3.5,5,TP	
C213	47.6	31.9	2201-000197	C-CERAMIC,DISC	10pF,0.5pF,50V,NPO,4x3.5,5,TP	
C216	61.7	98.1	2201-000138	C-CERAMIC,DISC	100pF,10%,50V,Y5P,4.0X4.0,2.5	
C217	60.4	101.6	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C218	60.5	105.2	2401-000028	C-AL	10uF,20%,50V,GP,5x11mm,5mm,TP	
C219	44.2	75	2401-000028	C-AL	10uF,20%,50V,GP,5x11mm,5mm,TP	
C220	31.4	64.2	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C221	42.5	78.8	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C222	19.6	81.8	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C223	22.4	18.7	2401-000809	C-AL	220uF,20%,16V,GP,8x12,5mm,TP	
C301	262.2	238.8	2301-001027	C-FILM,PEF	15nF,10%,250V,9.5x12x4.5,5mm,T	
C302	217.5	226.8	2301-000014	C-FILM,PEF	6.8nF,5%,100V,5.8x12.5mm,5mm,T	
C303	120	103.8	2401-000023	CAP-AL.ELEC,105M,1H	(T)50V 1M	
C304	114.4	56.3	2305-000004	C-FILM,MPEF	220nF,10%,100V,12.7x16,5mm,TP	
C305	92.3	69.9	2401-000037	CAP-AL.ELEC,477M,1C	(T)470UF,16V,20%,R-RADIAL,8x11.5	
C307	114	43.2	2401-000849	CAP-AL.ELEC,227M,1V	(T)35V 220M	
C308	111.1	73	2301-000257	C-FILM,PEF	4.7nF,10%,100V,5.8x12.5mm,5mm	
C309	81.3	67.8	2401-000028	C-AL	10uF,20%,50V,GP,5x11mm,5mm,TP	
C310	124.4	27.5	2401-001016	C-AL	3.3uF,20%,50V,BP,6x11mm,5mm,TP	
C311	42.8	139.5	2301-000168	C-FILM,PEF	150nF,5%,100V,11.5x19mm,7.5mm	
C312	33.3	140.8	2305-000001	C-FILM,MPEF	470nF,10%,63V,6.0X15.5X7.5,5mm	
C313	34.1	131	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C314	24.2	135.1	2401-000031	CAP-AL.ELEC,476M,1C	(T)16V 47M	
C315	99	61.3	2201-000013	CAP-CERAMIC,471K,1H,Y5P	470PF,50V,10%,10%,Y5P,DISC-	
C316	81.3	63.1	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
C413	100.2	163.4	2301-000016	C-FILM,PEF	22nF,5%,100V,7.2x4.5x9.0mm,5mm	
C414	128.4	167.2	2401-000029	CAP-AL.ELEC,106M,2A	(T)100V 10M	
C416	108.8	168.2	2201-000469	C-CERAMIC,DISC	330pF,10%,500V,Y5P,6x3.5,5,TP	
C417	168.5	172.5	2305-000231	CAP-MPETP,105K,1J,5P	(T)63V 105K	
C418	178.4	227.5	2303-001023	C-FILM,PPF	2.2nF,5%,2.5KV,23x13x19,7.5mm	⚠
C419	165.8	227.5	2303-001023	C-FILM,PPF	2.2nF,5%,2.5KV,23x13x19,7.5mm	⚠
C421	108.6	237.2	2306-000137	CAP-MPPF,184J,2E,7.5P	180NF,250V 5%,RE-RADIAL	
C422	58.3	226.1	2306-000171	CAP-MPPF,274J,2E,7.5P	(T)250V 274J	
C424	80.2	210	2201-000291	CAP-CERAMIC,102K,2H,Y5P	1NF,500V,20%,10%,Y5P,DISC-R	
C426	90.2	213	2201-000291	CAP-CERAMIC,102K,2H,Y5P	1NF,500V,20%,10%,Y5P,DISC-R	
C427	97.6	204	2401-000037	CAP-AL.ELEC,477M,1C,8x11.5	(T)470UF,16V,20%,R-RADIAL	
C428	74.1	190.1	2401-000031	CAP-AL.ELEC,476M,1C	(T)16V 47M	
C429	52.7	172.3	2401-000027	CAP-AL.ELEC,475M,1H	(T)50V 4.7M	
C430	43.2	170.6	2401-000031	CAP-AL.ELEC,476M,1C	(T)16V 47M	
C431	39.3	218.7	2306-000180	CAP-MPPF,304J,2G	400V 304J	
C432	49.8	218.8	2306-000007	CAP-MPPF,474J,2E	250V 474J	
C433	53.6	168.3	2301-000016	C-FILM,PEF	22nF,5%,100V,7.2x4.5x9.0mm,5mm	
C434	28.8	235.1	2306-000125	C-FILM,MPPF	120nF,5%,250V,21.5x11mm,7.5mm	
C436	124.9	234.6	2301-000017	C-FILM,PEF	33nF,10%,100V,7.5x12.5mm,5mm,T	
C437	43.3	163.6	2305-000291	C-FILM,MPEF	220nF,5%,63V,7.5x13.5mm,5mm,TP	
C439	57.4	163.3	2301-000016	C-FILM,PEF	22nF,5%,100V,7.2x4.5x9.0mm,5mm	
C440	96.5	191.8	2401-000887	C-AL	220uF,20%,63V,GP,10x20mm,5mm,T	
C441	32.3	154.2	2301-000011	C-FILM,PEF	1nF,5%,100V,10.5x12.5x6.5,5mm	
C442	135.9	211.8	2305-000011	C-FILM,MPEF	470nF,5%,250V,21.5X13.0X7.9,17	
C443	36	163.2	2305-000291	C-FILM,MPEF	220nF,5%,63V,7.5x13.5mm,5mm,TP	
C444	68.2	141.3	2401-000025	CAP-AL.ELEC,107M,1C	(T)16V 100M	
C445	65.7	141.3	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C446	66.4	136.7	2401-000025	CAP-AL.ELEC,107M,1C	(T)16V 100M	
C447	58.3	140.4	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C448	115.9	208	2201-000291	CAP-CERAMIC,102K,2H,Y5P	1NF,500V,20%,10%,Y5P,DISC-R	
C449	65.8	122.4	2201-000009	C-CERAMIC,DISC	22pF,5%,50V,NPO,4x3.5,5,TP	
C450	39.5	166.2	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C451	37.4	157.8	2301-000012	C-FILM,PEF	2.2nF,5%,100V,10.5x12.5x6.5,5m	
C452	82.6	160.3	2301-000010	CAP-MYLAR,104J,2A,5P	(T)100V 104J	
C453	18.3	159.2	2401-001016	C-AL	3.3uF,20%,50V,BP,6x11mm,5mm,TP	
C454	58.4	122.4	2201-000009	C-CERAMIC,DISC	22pF,5%,50V,NPO,4x3.5,5,TP	
C456	10.9	227.6	2306-000131	C-FILM,MPPF	150nF,5%,250V,21.5x11mm,7.5mm	
C457	49.1	159.6	2202-000003	C-CERAMIC,MLC-RADIAL	680pF,0.02,100V,NPO,5.1x5.1x3.	
C458	20.6	235	2306-000125	C-FILM,MPPF	120nF,5%,250V,21.5x11mm,7.5mm	
C459	130	198.8	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C455_5	31.1	168	2301-000012	C-FILM,PEF	2.2nF,5%,100V,10.5x12.5x6.5,5m	15Inch only
C461	65.2	159.7	2301-000231	C-FILM,PEF	3.3nF,5%,100V,5.8x12.5mm,5mm,T	
C462	27.4	212.3	2301-000012	C-FILM,PEF	2.2nF,5%,100V,10.5x12.5x6.5,5m	
C463	45.7	208	2301-000012	C-FILM,PEF	2.2nF,5%,100V,10.5x12.5x6.5,5m	
C464	9.4	212.5	2301-000012	C-FILM,PEF	2.2nF,5%,100V,10.5x12.5x6.5,5m	
C465_7	26.6	173.1	2301-000287	CAP-MYLAR,562J,2A,5P	(T)100V 562J	17Inch only
C477	45.6	176.5	2401-000050	C-AL	10uF,20%,16V,GP,5x11mm,2mm,TP	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
C501	172.4	166.6	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C503	240.5	129.2	2401-000032	CAP-AL.ELEC,107M,1H	(T)50V 100M	
C504	142.9	134.7	2301-000015	C-FILM,PEF	10nF,5%,100V,7x3.2x7mm,5mm,TP	
C505	161.1	148.1	2301-000011	C-FILM,PEF	1nF,5%,100V,10.5x12.5x6.5,5mm	
C506	276	123.8	2201-000013	CAP-CERAMIC,471K,1H,Y5P	470PF,50V,10%,10%,Y5P,DISC-	
C507	281.3	141.9	2303-000145	C-FILM,PPF	1nF,10%,2KV,23x13mm,7.5mm,TP	⚠
C509	155.7	140.7	2401-000331	C-AL	100uF,20%,35V,LZ,8x11.5mm,5mm	
C510	154.9	135.9	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C511	233.7	145.5	2306-000007	CAP-MPPF,474J,2E	250V 474J	
C512	218.3	134.1	2201-000672	CAP-CERAMIC,821K,2H,Y5P	820PF,500V,10%,10%,Y5P,DISC	
C514	122.4	143.2	2401-000031	CAP-AL.ELEC,476M,1C	(T)16V 47M	
C515	268.6	139.6	2401-000025	CAP-AL.ELEC,107M,1C	(T)16V 100M	
C516	122.4	149.6	2305-000138	C-FILM,MPEF	100nF,10%,63V,7.5x12.5mm,5mm,T	
C517	115.4	153.9	2401-001016	C-AL	3.3uF,20%,50V,BP,6x11mm,5mm,TP	
C519	134.8	134.3	2305-000291	C-FILM,MPEF	220nF,5%,63V,7.5x13.5mm,5mm,TP	
C520	288.2	162.4	2401-001195	CAP-AL.ELEC,336M,1H	(T)50V 33M	
C521	151.2	134.9	2401-000053	CAP-AL.ELEC,106M,1E	(T)25V 10M	
C523	282.4	229.5	2401-000638	C-AL	2.2uF,20%,350V,WT,10x12.5mm,5m	
C527	282.8	172.2	2401-000026	CAP-AL.ELEC,335M,1H	(T)50V 3.3M	
C522_7	283.7	187.1	2401-000638	C-AL	2.2uF,20%,350V,WT,10x12.5mm,5m	17Inch only
C535	183.6	151	2401-000887	C-AL	220uF,20%,63V,GP,10x20mm,5mm,T	
C537_7	207.4	157.2	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	17Inch only
C538_7	281	214	2201-000285	C-CERAMIC,DISC	1nF,10%,1KV,Y5P,8.0X4.0,5,TP	17Inch only
C539_7	66.2	219.1	2306-000224	C-FILM,MPPF	47nF,5%,400V,16.5x12.5mm,7.5mm	17Inch only
C540_7	61.9	178.3	2401-000471	C-AL	10uF,20%,50V,BP,6x11mm,5mm,TP	17Inch only
C543_7	205.6	163.1	2201-000469	C-CERAMIC,DISC	330pF,10%,500V,Y5P,6x3.5,5,TP	17Inch only
C581	97.8	131.2	2401-000031	CAP-AL.ELEC,476M,1C	(T)16V 47M	
C582	113.9	138.3	2401-000050	C-AL	10uF,20%,16V,GP,5x11mm,2mm,TP	
C600	292.6	24	2301-001157	C-FILM,MPEF	47nF,10%,275V,BK,17.5x12x6,15m	
C601	302.8	26.5	2201-000023	C-CERAMIC,DISC	2.2nF,20%,125V,Y5U,11x7,5,TP	
C602	302.8	38.6	2201-000023	C-CERAMIC,DISC	2.2nF,20%,125V,Y5U,11x7,5,TP	
C603	258.5	46.9	2201-000024	CAP-CERAMIC,472M,2B	4.7NF,125VAC,20%,Y5V,RADIAL	
C604	272.9	46.9	2201-000024	CAP-CERAMIC,472M,2B	4.7NF,125VAC,20%,Y5V,RADIAL	
C605	292.6	24	2301-001156	C-FILM,MPEF	220nF,10%,275V,BK,26x18x8.5,22	
C606	228.7	30.4	2401-000052	CAP-AL.ELE,227M,2G,30X35	(B)220UF,400V,20%,R-RADIAL	
C607	194.8	25.7	2201-000019	C-CERAMIC,DISC	10nF,+80-20%,500V,Y5V,10x4,5,T	
C608	188.2	18	2301-000016	C-FILM,PEF	22nF,5%,100V,7.2x4.5x9.0mm,5mm	
C609	228	41.9	2305-000291	C-FILM,MPEF	220nF,5%,63V,7.5x13.5mm,5mm,TP	
C610	202.7	78.4	2401-001576	C-AL	47uF,20%,50V,GP,8x11.5mm,5mm,T	
C612	205.8	59.7	2401-000023	CAP-AL.ELEC,105M,1H	(T)50V 1M	
C613	193.7	75	2301-000010	CAP-MYLAR,104J,2A,5P	(T)100V 104J	
C614	182.4	19.4	2201-000024	CAP-CERAMIC,472M,2B	4.7NF,125VAC,20%,Y5V,RADIAL	
C619	97.7	96.3	2401-000025	CAP-AL.ELEC,107M,1C	(T)16V 100M	
C620	136.5	32	2201-000014	C-CERAMIC,DISC	330pF,10%,1KV,Y5P,6x3.5,5,TP	
C621	168.6	19.4	2201-000024	CAP-CERAMIC,472M,2B	4.7NF,125VAC,20%,Y5V,RADIAL	
C623	150.3	15.1	2301-000011	C-FILM,PEF	1nF,5%,100V,10.5x12.5x6.5,5mm	
C624	147.8	24.2	2301-000287	CAP-MYLAR,562J,2A,5P	(T)100V 562J	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
C625	130.3	54.9	2301-000015	C-FILM,PEF	10nF,5%,100V,7x3.2x7mm,5mm,TP	
C626	125.8	40	2401-000540	CAP-AL.ELEC,157M.1J	(T)150UF,63V,20%,R-RADIAL,10X20	
C627	130.7	89.8	2401-000041	C-AL	220uF,20%,16V,GP,10x12.5mm,5mm	
C628	133.7	92.2	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C629	115	30.3	2401-000037	CAP-AL.ELEC,477M	(T)470UF,16V,20%,R-RADIAL,1C,8x11.5	
C620_D	206.8	42.8	2201-000012	CAP-CERAMIC,221K,3A,Y5P	220PF,1KV,10%,10%,Y5P,DISC-	Delete
C630	128.4	46.7	2201-000469	C-CERAMIC,DISC	330pF,10%,500V,Y5P,6x3.5,5,TP	
C631	144.7	59.2	2401-001869	C-AL	100uF,20%,100V,GP,13x20mm,5mm	
C632	129.1	74.6	2401-000039	CAP-AL.ELEC,108M.1C,10x16	(T)1000UF,16V,20%,R-RADIAL	
C634	165.7	89	2401-000039	CAP-AL.ELEC,108M.1C,10x16	(T)1000UF,16V,20%,R-RADIAL	
C636	237.5	96.1	2401-000031	CAP-AL.ELEC,476M,1C	(T)16V 47M	
C633_U	141.2	84.9	2401-000151	C-AL	1000uF,20%,25V,GP,12.5x20mm,5m	USB only
CN102A	315.3	171.6	3711-003568	CONNECTOR-HEADER	NOWALL,22P,1R,2.54mm,STRAIGHT	
CN102C	323	155	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN102E	315.3	230.5	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN300A_7	119.4	54.4	3711-001483	CONNECTOR-HEADER	NOWALL,3P,1R,5.0mm,STRAIGHT,SN	17Inch only
CN301_5	176.1	218.1	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	15Inch only
CN400	176.1	202.1	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN401	176.1	210.1	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	⚠
CN402	176.1	192.1	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN600	305	87.8	3711-000217	CONNECTOR-HEADER	1WALL,3P,1R,3.96mm,STRAIGHT,SN	
CN601	229.8	67.4	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN602	229.8	60	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN603	314.2	28.9	3721-001006	PLUG-AC POWER	3P,10/24mm,SN	
CN_TCO	143.2	205.9	3711-000197	CONNECTOR-HEADER	1WALL,3P,1R,2.5mm,STRAIGHT,SN	
CN_TILT	129.5	18.7	3711-000197	CONNECTOR-HEADER	1WALL,3P,1R,2.5mm,STRAIGHT,SN	
CN_USB	321.5	74.4	3722-001100	JACK-DIN	4P/2C,6mm,AG,BLK,NO	USB only
D302	303.2	218.8	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D303	106.1	55.1	0402-000128	DIODE-REC,1N4002,DO-41	70V,1A,1.1V,1A,2000NS,0.5A	
D402	160.1	179.1	0402-001131	DIODE-RECTIFIER	UG1B,100V,1A,DO-204AL,TP	
D403	191.7	217.1	0402-001046	DIODE-RECTIFIER	1500V,10A,TO220F,ST	
D405	132.7	226.7	0401-000006	DIODE-SWITCHING	BAV21,200V,250mA,400mW,50nS,DO	
D406	80.1	236	0402-001114	DIODE-RECTIFIER	1N4936GP,400V,1A,DO-204AL,TP	
D407	91.1	232.4	0402-001114	DIODE-RECTIFIER	1N4936GP,400V,1A,DO-204AL,TP	
D408	110.6	212.1	0402-000274	DIODE-REC,UF4004,DO-41	400V,1A,1V,1A,50NS,0.5A	
D409	109.4	203.2	0402-000274	DIODE-REC,UF4004,DO-41	400V,1A,1V,1A,50NS,0.5A	
D404_D	57	199.8	0403-000006	DIODE-ZENER	UZ16BM,16V,15.33-15.96V,500mW	Delete
D410	65.3	152	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D413	26.3	206.7	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D414	38.2	198.7	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D415	13.5	205.3	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D416	101	180	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D477	38.2	175.8	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D502	163.8	133.5	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D508	229.1	130.9	0402-001118	DIODE-RECTIFIER	UF1G,400V,1.2A,DO-204AL,TP	
D509	223.4	138.7	0402-000274	DIODE-REC,UF4004,DO-41	400V,1A,1V,1A,50NS,0.5A	
D510	269	160.4	0401-000006	DIODE-SWITCHING	BAV21,200V,250mA,400mW,50nS,DO	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
D511	138.5	148.4	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D513	155.9	145	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D515	187.2	130.7	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D517	272.9	216.4	0402-001114	DIODE-RECTIFIER	1N4936GP,400V,1A,DO-204AL,TP	
D519	282.9	174.6	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D521	285.9	167.2	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D522	270.2	239	0401-000006	DIODE-SWITCHING	BAV21,200V,250mA,400mW,50nS,DO	
D526	264.8	238.4	0402-001114	DIODE-RECTIFIER	1N4936GP,400V,1A,DO-204AL,TP	
D524_7	266.8	166.2	0402-001114	DIODE-RECTIFIER	1N4936GP,400V,1A,DO-204AL,TP	17Inch only
D581	103.8	139.1	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D582	92.8	151.2	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D583	87.3	152.3	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	⚠
D600	249	68.7	0402-001111	DIODE-RECTIFIER	1N5397GP,600V,1.5A,DO-204AC,TP	
D602	235	72.1	0402-001111	DIODE-RECTIFIER	1N5397GP,600V,1.5A,DO-204AC,TP	
D603	235	59.9	0402-001111	DIODE-RECTIFIER	1N5397GP,600V,1.5A,DO-204AC,TP	
D604	249	63.5	0402-001111	DIODE-RECTIFIER	1N5397GP,600V,1.5A,DO-204AC,TP	
D605	134.4	26.9	0402-001114	DIODE-RECTIFIER	1N4936GP,400V,1A,DO-204AL,TP	
D606	152.5	37.8	0402-000012	DIODE-REC,UF4007,DO-41	ST 02169-218-100	
D607	193.6	46.8	0402-000017	DIODE-RECTIFIER	RGP02-12,1200V,0.5A,DO-204AL	
D608	152.2	42.3	0402-000005	DIODE-RECTIFIER	31DF4,400V,3A,DO-201AD	
D609	188.6	56.4	0402-001114	DIODE-RECTIFIER	1N4936GP,400V,1A,DO-204AL,TP	
D611	148.3	66.5	0402-001158	DIODE-RECTIFIER	RG2Z,200V,1.2A,DO-204,BK	
D614	157.4	72.5	0402-000249	DIODE-RECTIFIER	RG4,400V,1.5A	
D615	199.3	65.9	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D617	231.6	91.7	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D612_U	151.1	72.4	0402-000005	DIODE-RECTIFIER	31DF4,400V,3A,DO-201AD	USB only
D613_D	201.5	34.4	0402-000017	DIODE-RECTIFIER	RGP02-12,1200V,0.5A,DO-204AL	Delete
EY7	284	20	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY13	145	234.1	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY14	251	39.6	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY18	189.9	170.2	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY21	156	234.1	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY22	234.7	190.2	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY23	256.7	144.6	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY24	167.7	196	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY25	150.2	210.9	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY27	200.5	12	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
EY300	289.2	235.8	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
EY600	260.5	177.4	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY601	115.3	11.5	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
EY603	234.8	161.2	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY604	228.7	30.3	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
EY605	158.5	26.8	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY606	228.7	20.4	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
EY607	158.5	46.7	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY608	199.7	149.1	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
EY610	183.5	61.7	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
EY611	199.7	235.9	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
EY613	183.4	31.7	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
EY614	314.2	43	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
EY615	314.2	28.9	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
FG1	0	0	3601-000004	FUSE-FERRULE	250V,3.15A,SLOW BLOW,CERAMIC,5	
FH1	310.8	17.6	3602-000001	FUSE-CLIP,5.2X20,30MOHM	800GF,400-800GF	
H3	200.5	85.8	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
H5	115.3	85.2	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
H6	289.2	149.1	6042-000001	EYELET	EYELET 2.2 HOLE 3.0 PAD 5.0	
HS300	124.3	85.3	BH62-30415A	HEAT/SINK	A1050S,T2.0,CKB5237	
HS501	193.7	236	BH62-30416A	HEAT/SINK-FBT	A1050S,T1.0,CKB7227	
HS602	212.5	48.9	BH62-30018B	HEAT/SINK-TR	A1050S,T3,CQA4147	
HS603	108.6	97.4	BH62-30024A	HEAT/SINK-TR	SPC,T1,SN,CFX1577L	
IC201	73.3	9.4	1203-000495	IC-LIN,7045,REGULATOR	TO-92,3,+4.5V	
IC202	60.7	59.5	0903-001063	IC-MICROCONTROLLER	72E75,8BIT,DIP,42P,600MIL,24MH	
IC204	50.4	100.6	1103-001009	IC-EEPROM	24LC21,128X8BIT,DIP,8P,300MIL	
IC205	42.8	83.8	1103-001020	IC-EEPROM	24LC04,4Kx8BIT,DIP,8P,300MIL	
IC300	96.5	51.8	1204-000013	IC-CONSUMER/CIRCUIT	9302,TO-220,7P,15V/30V,VERTIC	
IC301	96.3	16.6	1201-001034	IC-OP AMP	272,DIP,8P,150MIL,DUAL,PLAST	
IC302	61.6	154.3	1204-001231	IC-DEF. PROCESSOR	TDA9109,DIP,32P,300MIL,PLASTIC	
IC501	133	138.1	1203-000182	IC-POSI.ADJUST REG.	494,DIP,16P,300MIL,PLASTIC	⚠
IC502	95.9	151.2	1201-000420	IC-OP AMP	358,DIP,8P,300MIL,DUAL,100V/mV	
IC600	142.5	96.3	1203-000001	IC-POSI.ADJUST REG.	7805,TO-220,3P,PLASTIC,4.8/5	
IC601	155	21	1203-000002	IC-LIN,431,REGULATOR	TO-92,3,36V(T)-SIMPLE	
IC602	220.6	43.5	BH13-10334H	IC-HYBRID	G-PROJECT,KA2H0880,SIP,5P,FET+	
IC603	106.1	100.9	1203-000165	IC-LIN,KA78R12,REGULATOR	TO-220,4,5V	
L401	110.6	224.3	BH27-20343M	COIL-PEAKING	750UH,10%,DR8*8,TAPING	
L405	121	229.4	BH27-20343H	COIL-PEAKING	2.7MH,10%,DR8*8,TP	
L406	142	220.3	BH27-20344D	COIL-CHOKE	50UH,10%,DR8*8,TAPING	
L407	119.7	193.7	BH27-20310H	COIL-CHOKE	0.18OHM,16.7*27.8,B,USTC0.	
L408	60.3	164.9	2701-000154	INDUCTOR-AXIAL	220uH,10%,4.2x9.8mm	
L402_5	0	0	BH27-20026A	COIL-H.LINEARITY	0.08OHM,0.2,DR1415,BULK,35MM	15Inch only
L402_7	156	234.1	BH27-20003A	COIL-LINEARITY	0.06OHM,0.15,DR-1415,IVORY,35M	17Inch only
L501_5	0	0	BH27-20342V	COIL-CHOKE	200UH,15%,DR14*20,BULK	15Inch only
L501_7	192.4	133.4	BH27-20310H	COIL-CHOKE	0.18OHM,16.7*27.8,B,USTC0.	17Inch only
L600	279.1	61.1	BH27-20344G	COIL-LINE FILTER	1.5MH,20%,SQ-2114,BULK	
L602	279	27.5	BH27-20310T	CHOKE-COIL	LSA07110P	
L601_D	0	0	BH27-20343N	COIL-LINE FILTER	15mH,BK,39MM	Delete
OP201	15	31.8	0601-001147	LED	ROUND,GRN,4.75mm,565nm	
OP601	167.7	14.2	0604-001018	PHOTO-COUPLE	DAR-TR, 63-125%, 200mW, DIP-4, RST	
Q201	15.4	14.6	0501-000586	TR-NPN,KSC945,TO-92,EBC	0.25W,60V,50V,5V,0.15A	
Q301	226.1	227.1	0501-000586	TR-NPN,KSC945,TO-92,EBC	0.25W,60V,50V,5V,0.15A	
Q403	105.3	169.9	0502-000008	TR-POWER	2SC3503-E,NPN,300V,300V,100mA	
Q405	8.7	216.6	0505-001102	FET-SILICON	IRFR/U230A,N,200V,7.5A,400mohm	
Q406	189.9	175.7	0502-001001	TR-POWER	KSC5088,NPN,1500V,1500V,8A,50W	⚠
Q407	81.5	185.3	0501-000010	TR-NPN,KSC1008,TO-92,ECB	0.8W,80V,60V,8V,0.7A	
Q408	26.1	216.6	0505-001102	FET-SILICON	IRFR/U230A,N,200V,7.5A,400mohm	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
Q409	45	211.7	0505-001129	FET-SILICON	IRF630A,N,200V,10uA,400mohm,72	
Q411	78.7	203.1	0505-001130	FET-SILICON	IRF740A,N,400V,10uA,550mohm,13	
Q412	93	163.4	0501-000581	TR-PNP,2N3906,TO-92,EBC	0.625W,40V,40V,5V,0.2A	
Q413	66.9	195.7	0501-000122	TR-NPN,2N3904,TO-92,EBC	0.625W,60V,40V,6V,0.2A	
Q414	88.1	163.4	0501-000122	TR-NPN,2N3904,TO-92,EBC	0.625W,60V,40V,6V,0.2A	
Q416	61.9	195.7	0501-000581	TR-PNP,2N3906,TO-92,EBC	0.625W,40V,40V,5V,0.2A	
Q417_7	32	173.1	0501-000586	TR-NPN,KSC945,TO-92,EBC	0.25W,60V,50V,5V,0.15A	17Inch only
Q477	40.4	173.3	0501-000303	TR-PNP,KSA733,TO-92,EBC	0.25W,-60V,-50V,-5V,-0.15A	
Q503	251.3	144.7	0502-001070	TR-POWER	2SC5339,NPN,50W,TO-3PF,ST,4-8	
Q504	212.7	138.5	0505-001130	FET-SILICON	IRF740A,N,400V,10uA,550mohm,13	
Q506	141.3	154	0501-000303	TR-PNP,KSA733,TO-92,EBC	0.25W,-60V,-50V,-5V,-0.15A	
Q507	289.8	167	0501-000303	TR-PNP,KSA733,TO-92,EBC	0.25W,-60V,-50V,-5V,-0.15A	
Q500_7	198.9	157.7	0501-000413	TR-SMALL SIGNAL	KSP44,NPN,625mW,TO-92,50-200	17Inch only
Q510	259.5	125.7	0501-000361	TR-SMALL SIGNAL	KSC2316-Y,NPN,900mW,TO-92L,BK,120-240	
Q511	291.2	181.1	0501-000303	TR-PNP,KSA733,TO-92,EBC	0.25W,-60V,-50V,-5V,-0.15A	
Q512	270.8	132.8	0501-000122	TR-NPN,2N3904,TO-92,EBC	0.625W,60V,40V,6V,0.2A	
Q513	259.5	135.4	0501-000609	TR-SMALL, SIGNAL	KTA916-Y, PNP,900mW,TO-92L,Bk,120-240	
Q514	167.1	137.2	0501-000483	TR-NPN,MPS2222A,TO-92	0.625W,75V,40V,6V,0.6A	
Q516	284.1	219.8	0501-000143	TR-SMALL SIGNAL	2N6520,PNP,625mW,TO-92,30-20	
Q517	292.6	221	0501-000586	TR-NPN,KSC945,TO-92,EBC	0.25W,60V,50V,5V,0.15A	
Q600	227.8	96.9	0501-000010	TR-NPN,KSC1008,TO-92,ECB	0.8W,80V,60V,8V,0.7A	
Q601	176.5	101.1	0502-000249	TR-PNP,KSB772,TO-126,ECB	1W,-40V,-30V,-5V,-3A	
Q602	166.2	97	0501-000586	TR-NPN,KSC945,TO-92,EBC	0.25W,60V,50V,5V,0.15A	
Q604	91.1	87	0501-000586	TR-NPN,KSC945,TO-92,EBC	0.25W,60V,50V,5V,0.15A	
R200	76.8	7.7	2001-000035	REF-CF,220,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R203	28.5	74.5	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R204	28.5	71.7	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R205	34	71.2	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R206	36.4	71.2	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R201_7	40	71.2	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	17Inch only
R218	59.5	70.4	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R210_7	61.7	81.8	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	17Inch only
R220	52.5	71.2	2001-000496	R-CARBON	20Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R221	50	71.2	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R222	47.6	71.2	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R224	20.8	68	2001-000652	R-CARBON	330ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R225	20.8	65.3	2001-000652	R-CARBON	330ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R231	7.7	66.6	2001-000538	R-CARBON	24Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R232	7.7	69.1	2001-000538	R-CARBON	24Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R233	70.7	100.9	2001-000538	R-CARBON	24Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R234	7.7	63.4	2001-000538	R-CARBON	24Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R235	52.4	29.8	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R236	36.7	30.4	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R239	29.4	18.4	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R237_U	34.3	18.4	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	USB only
R238_U	31.9	18.4	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	USB only
R240	27	18.4	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
R243	29.4	36.9	2001-000868	R-CARBON	56ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R244	27	36.9	2001-000868	R-CARBON	56ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R245	22.1	36.9	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R246	41.5	38.9	2001-000738	R-CARBON	4.7Mohm,5%,1/6W,AA,TP,1.8x3.2m	
R249	18.5	40.8	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R241_U	34.3	36.9	2001-000868	R-CARBON	56ohm,5%,1/6W,AA,TP,1.8x3.2mm	USB only
R242_U	31.9	36.9	2001-000868	R-CARBON	56ohm,5%,1/6W,AA,TP,1.8x3.2mm	USB only
R250	9.8	59.8	2001-000042	REF-CF,1K,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R251	6.9	49.7	2001-000106	R-CARBON	1.5Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R252	13.1	138.6	2001-000059	R-CARBON	5.6Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R253	13.3	128.9	2001-000069	R-CARBON	12Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R254	13	108.3	2001-000562	R-CARBON	27Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R255	65.6	86.2	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R256	65.6	91.8	2001-000868	R-CARBON	56ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R257	65.6	89.3	2001-000868	R-CARBON	56ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R258	32.3	88.9	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R259	32.3	91.4	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R303	244.6	232.6	2001-000042	REF-CF,1K,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R304	244.6	227.6	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R305	221.8	236.1	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R306	229.6	224.9	2001-000056	REF-CF,4.7K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R307	119.9	43	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R308	110.1	46.3	2001-000245	REF-CF,1.5,5%,1/2W	350V,-350 TO +350PPM/C,R-AX	
R309	108.6	69.3	2004-001022	R-METAL	5.6Kohm,1%,1/4W,AA,TP,2.4x6.4m	
R302_5	0	0	2001-003102	R-CARBON(S)	360ohm,5%,1/2W,AA,TP,2.4x6.4mm	15Inch only
R302_7	113.7	64.4	2001-001088	R-CARBON(S)	1Kohm,5%,1/2W,AA,TP,2.4x6.4mm	17Inch only
R310	103	74.4	2305-000005	R-METAL OXIDE(S)	1ohm,5%,2W,AA,TP,4x12mm	
R311	93.5	44.2	2004-000970	R-METAL	470ohm,1%,1/4W,AA,TP,2.4x6.4mm	
R312	93.3	59.1	2004-004144	R-METAL	2.64Kohm,1%,1/4W,AA,TP,2.4x6.4	
R313	79.9	78.2	2004-000252	R-METAL	11Kohm,1%,1/4W,AA,TP,2.4x6.4mm	
R316	70.9	20.4	2001-000069	R-CARBON	12Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R317	88.7	30.8	2001-000056	REF-CF,4.7K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R318	95.6	12.9	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R319	85.1	24.1	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R314_D	70.5	6.9	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	Delete
R315_5	0	0	2001-000678	R-CARBON	36Kohm,5%,1/6W,AA,TP,1.8x3.2mm	15Inch only
R315_7	95.2	28.3	2001-000075	R-CARBON	39Kohm,5%,1/6W,AA,TP,1.8x3.2mm	17Inch only
R320	126.5	19.4	2001-000022	R-CARBON(S)	33ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R321	83.7	83.7	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R401	43.2	173.6	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R409	120.8	181.2	2003-000703	R-METAL OXIDE(S)	470ohm,5%,3W,AA,TP,6x16mm	
R416	102.8	169.5	2001-000040	REF-CF,470,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R417	126.7	108.5	2003-000703	R-METAL OXIDE(S)	470ohm,5%,3W,AA,TP,6x16mm	
R418	135.5	169.4	2003-000512	REF-MO,15K,5%,3W(S	500V,-200 TO +200PPM/C,R-AX	
R419	112.5	161.8	2003-000793	REF-MO,8.2K,5%,2W(S	500V,-200 TO +200PPM/C,R-AX	
R414_5	0	0	2001-001005	R-CARBON	82ohm,5%,1/6W,AA,TP,1.8x3.2mm	15Inch only
R414_7	92.4	160.4	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	17Inch only

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
R420	75.6	234.4	2003-000767	REF-MO,680,5%,2W(S	350V,-350 TO +350PPM/C,R-AX	
R421	160.1	162.8	2003-000423	REF-MO,1.2,5%,3W(T	-359 TO +350PPM/C,R-AXIAL	
R422	163.5	179.1	2001-000020	R-CARBON(S)	22ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R423	105.4	233.8	2003-000710	R-METAL OXIDE(S)	47ohm,5%,2W,AA,TP,4x12mm	
R424	55.2	238.2	2001-000084	REF-CF,100K,5%,1/4W	250V,-600 TO -150PPM/C,R-AX	
R426	87.8	210.2	2001-000037	REF-CF,330,5%,1/2W(S	300V,-200 TO +200PPM/C,R-AX	
R427	76.7	212.9	2001-000037	REF-CF,330,5%,1/2W(S	300V,-200 TO +200PPM/C,R-AX	
R428	107.6	209.7	2001-000023	REF-CF,47,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R429	70.4	176.6	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R425_5	0	0	2001-000056	REF-CF,4.7K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	15Inch only
R425_7	28.8	174.2	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	17Inch only
R430	127.7	228.9	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R432	63.1	122.2	2001-000652	R-CARBON	330ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R433	21.1	192.3	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R434	31.6	195.9	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R435	16.1	192.3	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R436	37.1	160.4	2001-000086	R-CARBON	100Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R437	60.7	122.2	2001-000652	R-CARBON	330ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R438	108.1	206.2	2003-000386	REF-MO,910,5%,2W	350V,-200 TO +200PPM/C,R-AX	
R439	51.4	163.4	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R442	83.2	157	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R446	83.2	154.5	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R448	42.9	156.8	2004-004090	R-METAL	6.49Kohm,1%,1/4W,AA,TP,2.5x6.5	
R449	23.3	173.8	2001-000652	R-CARBON	330ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R441_7	64.7	175.2	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	17Inch only
R443_5	0	0	2001-000538	R-CARBON	24Kohm,5%,1/6W,AA,TP,1.8x3.2mm	15Inch only
R443_7	32.3	165.6	2001-000075	R-CARBON	39Kohm,5%,1/6W,AA,TP,1.8x3.2mm	17Inch only
R444_7	67.3	168.7	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	17Inch only
R450	18.1	162.3	2001-000077	REF-CF,47K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R455	53.8	130.5	2001-000044	R-CARBON	1.2Kohm,5%,1/4W,AA,TP,2.4x6.4m	
R456	51.2	130.5	2001-000044	R-CARBON	1.2Kohm,5%,1/4W,AA,TP,2.4x6.4m	
R459	31.3	124.1	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R451_5	0	0	2001-000632	R-CARBON	30Kohm,5%,1/6W,AA,TP,1.8x3.2mm	15Inch only
R451_7	15.8	170.5	2001-000082	R-CARBON	68Kohm,5%,1/6W,AA,TP,1.8x3.2mm	17Inch only
R460	130.2	234.7	2001-000075	R-CARBON	39Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R461	133.1	221.4	2001-000848	R-CARBON	560Kohm,5%,1/4W,AA,TP,2.4x6.4m	
R462	117.6	187.1	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R463	90.1	165.5	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R464	57	203.9	2001-000019	R-CARBON(S)	10ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R465	86.9	197.8	2003-000407	R-METAL OXIDE(S)	0.6ohm,5%,2W,AA,TP,4x12mm	
R469	23.4	192.3	2001-000632	R-CARBON	30Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R467_7	35	178.4	2001-000074	REF-CF,33K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	17Inch only
R470	32.4	192.4	2001-000632	R-CARBON	30Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R473	18.4	192.3	2001-000632	R-CARBON	30Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R474	10.9	220.9	2001-000432	R-CARBON	1Mohm,5%,1/4W,AA,TP,2.4x6.4mm	
R475	34	215.5	2001-000432	R-CARBON	1Mohm,5%,1/4W,AA,TP,2.4x6.4mm	
R476	46.1	215.5	2001-000432	R-CARBON	1Mohm,5%,1/4W,AA,TP,2.4x6.4mm	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
R477	35.9	168.8	2001-000093	R-CARBON	470Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R478	75.3	149.5	2001-000496	R-CARBON	20Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R479	47.4	134.6	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R509	137.6	135.2	2001-000688	REF-CF,390K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	⚠
R500_7	216.6	166.4	2001-001110	R-CARBON(S)	240Kohm,5%,1/2W,AA,TP,2.4x6.4m	17Inch only
R502_7	207.1	193.1	2001-001129	R-CARBON(S)	330Kohm,5%,1/2W,AA,TP,2.4x6.4m	17Inch only
R503_7	167	166.8	2001-000055	R-CARBON	4.7Kohm,5%,1/4W,AA,TP,2.4x6.4m	17Inch only
R504_7	218.7	159.7	2001-000105	R-CARBON	1.5Kohm,5%,1/4W,AA,TP,2.4x6.4m	17Inch only
R505_7	62.2	181.3	2001-000713	R-CARBON	3Kohm,5%,1/4W,AA,TP,2.4x6.4mm	17Inch only
R506_7	71.5	217.1	2003-000807	R-METAL OXIDE(S)	82ohm,5%,2W,AA,TP,4x12mm	17Inch only
R510	131.3	148.4	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R511	174.3	144	2001-000456	REF-CF,2.2,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R512	136.1	148.4	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R513	144.2	148.4	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R514	126	136.7	2001-000057	REF-CF,5.1K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	⚠
R515	208.7	138.5	2001-000077	REF-CF,47K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R516	128.4	154.9	2001-000057	REF-CF,5.1K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	⚠
R518	132.2	128.9	2001-000976	REF-CF,8.2K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R519	140.1	135.2	2001-000072	REF-CF,22K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R517_5	0	0	2004-001164	R-METAL	62Kohm,1%,1/4W,AA,TP,2.4x6.4mm	⚠ 15Inch
R517_7	209.2	224.4	2004-000515	R-METAL	200Kohm,1%,1/4W,AA,TP,2.4x6.4m	⚠ 17Inch
R520	187.2	133.7	2005-000002	REF-WW,0.27,5%,1W(NON	-100 TO +100PPM/C,R-AXAIL	
R521	145.8	128.7	2001-000064	REF-CF,7.5K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	⚠
R526	280.3	182.6	2001-000072	REF-CF,22K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R527	294.3	187.6	2001-000064	REF-CF,7.5K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R530	294.3	117.8	2001-000029	REF-CF,100,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R537	255.9	131.5	2001-000019	R-CARBON(S)	10ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R538	252.9	135.7	2001-000892	R-CARBON	6.8ohm,5%,1/2W,AA,TP,3.3x9mm	
R535_5	0	0	2001-000722	R-CARBON	4.3Kohm,5%,1/6W,AA,TP,1.8x3.2m	15Inch only
R535_7	288.4	175.1	2001-000051	R-CARBON	2.7Kohm,5%,1/6W,AA,TP,1.8x3.2m	17Inch only
R540	267.3	120	2003-000659	REF-MO,33,5%,1W(S	350V,-350 TO +350PPM/C,R-AX	
R541	273.4	120	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R542	244.7	135.1	2001-000211	REF-CF,1,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R543	247.8	146.1	2001-000021	REF-CF,27,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R544	223.4	135.3	2003-000386	REF-MO,910,5%,2W	350V,-200 TO +200PPM/C,R-AX	
R545	267.8	239	2001-000546	R-CARBON	270Kohm,5%,1/4W,AA,TP,2.4x6.4m	
R546	306.4	214.6	2001-000562	R-CARBON	27Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R547	296.7	215.1	2001-000067	REF-CF,10K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R548	296.7	217.5	2001-000055	R-CARBON	4.7Kohm,5%,1/4W,AA,TP,2.4x6.4m	
R549_5	0	0	2001-000084	REF-CF,100K,5%,1/4W	250V,-600 TO -150PPM/C,R-AX	15Inch only
R549_7	275.8	219.9	2001-000078	R-CARBON	56Kohm,5%,1/4W,AA,TP,2.4x6.4mm	17Inch only
R550	289.1	223.8	2001-000056	REF-CF,4.7K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R551	272.9	232.9	2001-000107	REF-CF,150K,5%,1/2W(S	300V,-200 TO +200PPM/C,R-AX	
R552	276.8	201.4	2001-000431	R-CARBON	1Mohm,5%,1/2W,AA,TP,3.3x9mm	
R554	278.7	123.8	2001-000040	REF-CF,470,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R555	170.3	148.4	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R556	169.9	141.7	2001-000976	REF-CF,8.2K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
R579	240	146.1	2001-000107	REF-CF,150K,5%,1/2W(S	300V,-200 TO +200PPM/C,R-AX	
R581	94.3	127.5	2004-000643	R-METAL	270Kohm,1%,1/4W,AA,TP,2.4x6.4m	⚠
R583	106.2	139.1	2001-000077	REF-CF,47K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	⚠
R584	93.1	155.9	2001-000074	REF-CF,33K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R585	108.5	124.9	2001-000077	REF-CF,47K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R586	293.4	132.7	2001-000367	R-CARBON	15Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R587	106.1	148.7	2001-000562	R-CARBON	27Kohm,5%,1/6W,AA,TP,1.8x3.2mm	⚠
R589	284	157.8	2001-000073	R-CARBON	33Kohm,5%,1/4W,AA,TP,2.4x6.4mm	
R582_5	0	0	2004-001040	R-METAL	50Kohm,1%,1/4W,AA,TP,2.4x6.4mm	⚠ 15Inch
R582_7	101.3	129.4	2004-004145	R-METAL	52Kohm,1%,1/4W,AA,TP,2.4x6.4mm	⚠ 17Inch
R600	234.6	94.4	2001-000056	REF-CF,4.7K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R601	231.6	89	2001-000023	REF-CF,47,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R602	164.9	16.8	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R603	143.6	10.6	2004-000947	R-METAL	43Kohm,1%,1/4W,AA,TP,2.4x6.4mm	⚠
R604	187.7	105.4	2001-000495	R-CARBON	20Kohm,5%,1/4W,AA,TP,2.4x6.4mm	
R605	164.9	13.1	2004-000150	R-METAL	1.5Kohm,1%,1/4W,AA,TP,2.4x6.4m	⚠
R606	146.5	10.6	2001-000060	REF-CF,6.8K,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R607	140.8	21.6	2004-004096	R-METAL	2.52Kohm,1%,1/4W,AA,TP,2.4x6.4	⚠
R609	229.7	78.4	2003-000771	REF-MO,68K,5%,2W(S	500V,-200 TO +200PPM/C,R-AX	
R610	189.5	24.7	2003-000741	REF-MO,56K,5%,3W(S	500V,-200 TO +200PPM/C,RE-R	
R611	152.2	46.6	2003-000471	REF-MO,10,5%,2W(S	350V,-350 TO +350PPM/C,R-AX	
R612	197.4	80.2	2001-001079	R-CARBON(S)	15ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R613	157.3	101.9	2008-001056	R-FUSIBLE(S)	2.2ohm,5%,1W,AA,TP,9.5x3.5mm	
R614	173.9	98.5	2001-000077	REF-CF,47K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R615	180.4	96.1	2001-000043	REF-CF,1K,5%,1/6W	150V,-1300 TO +350PPM,R-AXI	
R618	161.3	98.1	2001-000056	REF-CF,4.7K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R619	168.1	80.5	2001-000042	REF-CF,1K,5%,1/4W	250V,-350 TO +350PPM/C,R-AX	
R620	71.9	94.3	2001-000988	REF-CF,820K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R622	201.9	54.9	2001-001107	R-CARBON(S)	220ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R624	81.2	54.2	2001-000074	REF-CF,33K,5%,1/6W	150V,-1300 TO +350PPM/C,R-A	
R625	299.1	27.5	2001-000642	R-CARBON	330Kohm,5%,1/2W,AA,TP,3.3x9mm	
R626	103.8	100.9	2001-001138	R-CARBON(S)	390ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R630	152.5	35	2003-000468	R-METAL OXIDE(S)	10ohm,5%,1W,AA,TP,3.3x9mm	
RL401	90.4	221.4	3501-001064	RELAY-POWER	12Vdc,0.36W,2A,1FormC,10mS,5mS	
RL401_D	100.4	225.1	3501-000287	RELAY-MINIATURE,12V	2FORMC,5A,530mW,15mS,5mS	Delete
RL601	248.7	86.6	3501-000136	RELAY-MINIATURE	12V,360mW,5A,1FormA,10mS,10mS	
RL601_D	277.1	94	3501-000266	RELAY-POWER	12V,720mW,5A,2FormA,8mS,3mS	Delete
SK501_7	269.1	220.4	4715-000001	SURGE ABSORBER	1KV,+50-10%	17Inch only
SW200	7	19	3404-000244	SWITCH-TACT	15V,20mA,90-170gf,7.5x7mm,SPST	
SW201	7	148.5	3404-000244	SWITCH-TACT	15V,20mA,90-170gf,7.5x7mm,SPST	
SW202	7	131.5	3404-000244	SWITCH-TACT	15V,20mA,90-170gf,7.5x7mm,SPST	
SW203	7	120.5	3404-000244	SWITCH-TACT	15V,20mA,90-170gf,7.5x7mm,SPST	
SW204	7	103.5	3404-000244	SWITCH-TACT	15V,20mA,90-170gf,7.5x7mm,SPST	
SW401	76.3	239.5	3406-000002	SWITCH-TOGGLE,SP3T	ON-ON-ON,STRAIGHT	
T401	142	177.7	BH26-30303Y	TRANS-HOR.DRIVE	6-4(50MH	⚠
T402	167.6	190.9	BH26-30337K	TRANS-HOR.DRIVE	1.5mH,10P,EER2828,EER282	⚠
T402	0	0	BH26-30336D	TRANS-HOR.PULSE	1.5MH,10P,EER2828,PM-2,PL-3,1.	⚠ TCO

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
T501_5	246	175.7	BH26-10335B	TRANS-FBT	0.83mH,13PIN,FKD-15B00	15Inch only
T501_7	246	175.7	BH26-10335C	TRANS-FBT	0.8mH,15PIN,FERRITE,Y265	17Inch only
T501_D	246	175.7	BH26-10334E	TRANS-FBT	0.8mH,15P,HFL1327XD-RC	Delete
T502_7	294.1	194.9	BH26-30337J	TRANS-FOCUS	630uH,10P,EE1916,PL-3,EE19	17Inch only
T601	183.5	26.7	BH26-20335U	TRANS-POWER	470UH/310UH,18P,EER3942,PL-3,7	
T602	182.7	77	BH26-30302S	TRANS-SYNC.	3-1(250UH	
TEST	254.2	227.6	6042-000002	EYELET	EYELET 1.5 HOLE 2.2 PAD 4.0	
TH601	285.3	87.4	1404-000002	THERMISTOR-NTC	9OHM,20%	
TH602	229.8	67.5	1404-001020	THERMISTOR-NTC	8ohm,15%,17mW/C,BK	
VR401_D	130.3	238.5	2103-000493	RES-VAR,SF-ROUND	30%,0.1W,SIDE,5KOHM	Delete
VR501	212	232.6	2103-000454	VR-SEMI	50Kohm,25%,0.3W,SIDE	☢
VR600_D	151.5	6.2	2103-000006	RES-VAR,SF-ROUND	30%,0.1W,TOP,220 ,500OHM	Delete
X201	42.5	35.4	2801-003413	CRYSTAL-UNIT	24MHz,30ppm,28-ABQ,18pF,20ohm	
ZD502	133.7	148.4	0403-000005	DIODE-ZEN,UZ-5.1B,DO-35	0.5W,10MA	
ZD601	225.7	40.8	0403-000351	DIODE-ZEN,UZ-4.7B,DO-35	ST 02169-403-420	

10-2 Video PCB

10-2-1 Top View

10-2-2 Bottom View

10-2-3 Video PCB Parts

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
BD101	18.8	45.1	3301-000011	CORE-FERRITE BEAD	AA,3.5x1.0x5.7mm,1500,2375G	
BD102	0	0	3301-000011	CORE-FERRITE BEAD	AA,3.5x1.0x5.7mm,1500,2375G	
BD103	64.5	83.2	3301-000011	CORE-FERRITE BEAD	AA,3.5x1.0x5.7mm,1500,2375G	
BD104	66.9	87.1	3301-000011	CORE-FERRITE BEAD	AA,3.5x1.0x5.7mm,1500,2375G	
BD105	70.1	91	3301-000011	CORE-FERRITE BEAD	AA,3.5x1.0x5.7mm,1500,2375G	
C101	47.7	92.6	2401-000030	CAP-AL.ELEC,226M,1E	(T)25V 22M	
C102	32.5	80.9	2202-000321	C-CERAMIC,MLC-RADIAL	100nF,10%,50V,X7R,5.1x6.6,5.1	
C103	53.8	92.3	2202-000321	C-CERAMIC,MLC-RADIAL	100nF,10%,50V,X7R,5.1x6.6,5.1	
C104	33.2	66.5	2401-000027	C-AL	4.7uF,20%,50V,GP,5x11mm,5mm,TP	
C105	25.2	70.1	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C106	25.5	62.9	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C108	32.6	85.3	2401-000031	C-AL	47uF,20%,16V,GP,6.3x11mm,5mm,T	
C109	16.5	36.7	2301-000011	C-FILM,PEF	1nF,5%,100V,10.5x12.5x6.5,5mm	
C110	10.5	23.1	2201-000680	C-CERAMIC,DISC	82pF,5%,50V,NPO,8x3.5,5,TP	
C112	31.4	31.8	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C113	39.5	26.3	2401-000025	C-AL	100uF,20%,16V,GP,8x11.5mm,3.5m	
C114	25.6	24.1	2202-000321	C-CERAMIC,MLC-RADIAL	100nF,10%,50V,X7R,5.1x6.6,5.1	
C115	21.6	29.5	2201-000234	C-CERAMIC,DISC	150pF,5%,50V,NPO,10x3.5,5,TP	
C116	31.8	18.7	2301-000021	CAP-MYLAR,683J,2A,5P	(T)100V 683J	
C118	53.7	29.1	2401-000597	C-AL	1uF,20%,50V,GP,4x7mm,1.5mm,TP	
C119	50.7	13.5	2202-002008	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,50V,Y5V,2.3X3.0	
C120	54.6	20.3	2401-000042	CAP-AL.ELEC,107M,1C	(T)16V 100M	
C121	0	0	2401-000050	C-AL	10uF,20%,16V,GP,5x11mm,2mm,TP	
C122	74.6	28.4	2201-000010	C-CERAMIC,DISC	33pF,5%,50V,NPO,5x3.5,5,TP	
C124	69.8	69.6	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C125	109.1	60.8	2301-000010	CAP-MYLAR,104J,2A,5P	(T)100V 104J	
C126	96	57.4	2401-000029	C-AL	10uF,20%,100V,GP,8x11.5mm,5mm	
C128	80.6	13.1	2301-000016	C-FILM,PEF	22nF,5%,100V,7.2x4.5x9.0mm,5mm	
C129	72.4	19.9	2301-000012	C-FILM,PEF	2.2nF,5%,100V,10.5x12.5x6.5,5m	
C130	49.4	28.4	2301-000015	CAP-MYLAR,103J,2A,5P	(T)100V 103J	
C131	98.3	23.9	2401-000037	C-AL	470uF,20%,16V,GP,8x11.5mm,5mm	
CB01	25.2	72.9	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CB03	50.7	58	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CB04	60.2	63.8	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CB05	104.3	77.6	2305-000009	CAP-MPETP,104J,2E,7.5P	(T)250V 104J	
CB06	114.1	67.1	2301-000015	CAP-MYLAR,103J,2A,5P	(T)100V 103J	
CB07	93	59.6	2201-000010	C-CERAMIC,DISC	33pF,5%,50V,NPO,5x3.5,5,TP	
CB09	96	44.4	2401-000023	C-AL	1uF,20%,50V,GP,5x11mm,5mm,TP	
CG01	24.7	78	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CG03	51.3	89.5	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CG04	53.2	71.2	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CG05	99	79.3	2305-000009	CAP-MPETP,104J,2E,7.5P	(T)250V 104J	
CG06	114.9	70.7	2301-000015	CAP-MYLAR,103J,2A,5P	(T)100V 103J	
CG07	87.2	62.4	2201-000010	C-CERAMIC,DISC	33pF,5%,50V,NPO,5x3.5,5,TP	
CG09	102.5	44.4	2401-000023	C-AL	1uF,20%,50V,GP,5x11mm,5mm,TP	
CN101	11.2	75.8	3711-003614	CONNECTOR-HEADER	BOX,13P,1R,2mm,ANGLE,SN	
CN103	57.3	93.3	3711-001147	CONNECTOR-HEADER	BOX,9P,1R,2.50mm,ANGLE,SN	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
CN104	50.4	10.5	3710-001180	CONNECTOR-SOCKET	22P,1R,2.54mm,ANGLE,AU	
CR01	25.2	90.5	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CR03	44.7	96.3	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CR04	49.2	78.6	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
CR05	92.4	82.3	2305-000009	CAP-MPETP,104J,2E,7.5P	(T)250V 104J	
CR06	114.9	74.4	2301-000015	CAP-MYLAR,103J,2A,5P	(T)100V 103J	
CR09	110.4	44.3	2401-000023	C-AL	1uF,20%,50V,GP,5x11mm,5mm,TP	
D101	88.1	18.8	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D102	73	77.5	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D103	48.2	24.1	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D104	65.7	40.4	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
D105	75.3	13.1	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
DB01	14.2	70.2	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
DB02	22.2	67.7	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
DB03	106.3	75.1	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
DB04	106.5	95.4	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
DB05	110.9	85.3	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
DG01	14	78.1	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
DG02	22	75.6	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
DG03	101.2	75.2	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
DG04	101.1	95.2	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
DG05	113.5	85.3	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
DR01	14	88.1	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
DR02	22	85.6	0401-000005	DIODE-SIG,1N4148,DO-35	75V,150MA,1V,10MA	
DR03	96.1	75.2	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
DR04	95.2	95.2	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
DR05	116.1	85.3	0401-000006	DIODE-SIG,BAV21,DO-35	250V,250MA,1V,100MA	
HS1	63.9	62.9	BH62-30410A	HEAT/SINK	A6063S,T2.5,CGH7609	
IC101	36.9	90.9	1201-001163	IC-VIDEO AMP	2143,DIP,24P,300MIL,SINGLE,P	⚠
IC102	84.5	54.3	BH13-10334K	IC-HYBRID	G17E,LM2405,SIP,11P,CRT/DRIVER	⚠ ⚠
IC103	115.5	47.9	BH13-10335D	IC-HYBRID	CKB7227,HIS0214A,SIP,10P,VIDEO	
IC104	23.1	33.7	BH09-10303Q	IC-OSD PROCESSOR	LSC4390,DIP,24P,300MIL,PLASTIC	⚠ ⚠
IC105	13.4	24.1	0801-000337	IC-CMOS LOGIC	74HCT14,SCHIMITT INVERTER,DIP	
J1			BH39-40361A	CBF-HARNESS	40MM,BLK,UL1015,AWG22	
J2			BH39-40057A	CBF-HARNESS	1P,50MM,BLK,UL1015,#22	
L101	44.9	24.8	2701-000125	INDUCTOR-AXIAL	150uH,10%,2.8x7mm	
L102	116.8	57.1	2701-000128	INDUCTOR-AXIAL	15uH,10%,4.2x9.8mm	
Q102	68.7	23.5	0501-000492	TR-NPN,MPS3646,TO-92,EBC	40V,15V,5V,0.3A	
Q103	81.7	24.3	0501-000122	TR-SMALL SIGNAL	2N3904,NPN,625mW,TO-92,100-3	
R101	9.8	34.4	2001-000043	R-CARBON	1Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R102	7.4	29	2001-000553	R-CARBON	270ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R103	5.7	41.6	2001-000029	R-CARBON	100ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R104	39.5	51.1	2001-000069	R-CARBON	12Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R105	57.2	86.1	2001-000067	R-CARBON	10Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R106	49.2	83.6	2001-000106	REF-CF,1.5K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
R107	22.4	48	2001-000048	R-CARBON	2.2Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R108	108.4	16.6	2003-000704	R-METAL OXIDE(S)	47Kohm,5%,1W,AA,TP,3.3x9mm	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
R109	65.9	14.4	2001-000856	R-CARBON	560ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R110	63.5	14.4	2001-000856	R-CARBON	560ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R111	24.1	21.4	2001-000046	REF-CF,1.8K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
R112	40.9	18.7	2001-000106	REF-CF,1.5K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
R113	34.6	29.9	2001-000097	REF-CF,1M,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
R114	32.1	26.9	2001-000059	REF-CF,5.6K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
R115	54.4	31.3	2001-000976	R-CARBON	8.2Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R116	66.3	28.4	2001-000051	R-CARBON	2.7Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R118	72.1	22.2	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
R119	83.2	13.1	2001-000053	REF-CF,3.3K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
R120	80.7	37.9	2001-000043	R-CARBON	1Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R122	63.1	40.4	2001-000043	R-CARBON	1Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R123	60.6	31.4	2001-000040	R-CARBON	470ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R124	85.9	13.8	2001-000067	R-CARBON	10Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R125	87.5	36.1	2001-000604	R-CARBON	3.6Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R126	90.1	43.3	2001-000056	R-CARBON	4.7Kohm,5%,1/6W,AA,TP,1.8x3.2m	
R127	35.4	11.8	2001-000868	R-CARBON	56ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R128	9.7	20.4	2001-000868	R-CARBON	56ohm,5%,1/6W,AA,TP,1.8x3.2mm	
R129	12	26	2001-000067	R-CARBON	10Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R130	18.5	32	2001-000067	R-CARBON	10Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
R135	31.5	58	2001-000067	R-CARBON	10Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
RB01	14.2	65.2	2001-000026	REF-CF,75,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RB02	14.2	72.9	2001-000026	REF-CF,75,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RB04	63.2	59	2001-000039	R-CARBON	390ohm,5%,1/6W,AA,TP,1.8x3.2mm	
RB05	53.2	61.4	2001-000301	REF-CF,10,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RB06	103.7	64.2	2001-000323	R-CARBON	120ohm,5%,1/4W,AA,TP,2.4x6.4mm	
RB07	83.9	80.9	2001-000547	REF-CF,270K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RB08	71.3	52.1	2001-000086	R-CARBON	100Kohm,5%,1/6W,AA,TP,1.8x3.2m	
RB15	92.7	43.8	2001-000043	R-CARBON	1Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
RB18	42.7	55.6	2001-000077	REF-CF,47K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RG01	14	83.1	2001-000026	REF-CF,75,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RG02	14	80.6	2001-000026	REF-CF,75,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RG04	60.2	66.2	2001-000039	R-CARBON	390ohm,5%,1/6W,AA,TP,1.8x3.2mm	
RG05	53.2	68.7	2001-000301	REF-CF,10,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RG06	98.7	60.2	2001-000323	R-CARBON	120ohm,5%,1/4W,AA,TP,2.4x6.4mm	
RG07	86.6	80.9	2001-000547	REF-CF,270K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RG08	87.1	71.7	2001-000086	R-CARBON	100Kohm,5%,1/6W,AA,TP,1.8x3.2m	
RG15	99.2	43.7	2001-000043	R-CARBON	1Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
RG18	50.9	51.6	2001-000077	REF-CF,47K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RR01	14	93.1	2001-000026	REF-CF,75,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RR02	14	90.5	2001-000026	REF-CF,75,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RR04	59.2	76.1	2001-000039	R-CARBON	390ohm,5%,1/6W,AA,TP,1.8x3.2mm	
RR05	53.2	73.7	2001-000301	REF-CF,10,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RR06	90.1	57.3	2001-000323	R-CARBON	120ohm,5%,1/4W,AA,TP,2.4x6.4mm	
RR07	89.3	80.9	2001-000547	REF-CF,270K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	
RR15	107.2	43.7	2001-000043	R-CARBON	1Kohm,5%,1/6W,AA,TP,1.8x3.2mm	
RR18	43	47	2001-000077	REF-CF,47K,5%,1/6W	150V,-1300 TO +350PPM/C,R-AXIAL	

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
ZD101	21.9	56.1	0403-000005	DIODE-ZEN,UZ-5.1B,DO-35	0.5W,10MA	
ZD102	21.9	60.4	0403-000005	DIODE-ZEN,UZ-5.1B,DO-35	0.5W,10MA	
ZD103	15.7	45.1	0403-000005	DIODE-ZEN,UZ-5.1B,DO-35	0.5W,10MA	
ZD104	21.9	51.2	0403-000005	DIODE-ZEN,UZ-5.1B,DO-35	0.5W,10MA	
ZD105	21.9	53.7	0403-000005	DIODE-ZEN,UZ-5.1B,DO-35	0.5W,10MA	

10-3-3 CRT PCB Parts (CKB5237L)

Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
BD102	63.2	49.1	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
C181	46.1	43.4	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C182	67.3	22.4	2201-000530	C-CERAMIC,DISC	4.7nF,10%,500V,Y5P,12.5x4,5,TP	
C183	65.7	50.2	2201-000285	C-CERAMIC,DISC	1nF,10%,1KV,Y5P,8.0X4.0,5,TP	
CN12	67.5	34.2	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN13	9.7	62.9	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN14	71.2	63.7	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN15	8.6	14.7	3711-003233	CONNECTOR-HEADER	BOX,9P,1R,2mm,ANGLE,SN	
CRT1	0	0	BH03-10337W	CRT-COLOR	15,0.28,M36KUK35X02(E/LP	
LB01	28.3	38.9	2701-000173	INDUCTOR-AXIAL	330nH,20%,4.2x9.8mm	
LG01	17.3	30.4	2701-000173	INDUCTOR-AXIAL	330nH,20%,4.2x9.8mm	
LR01	22.6	30.4	2701-000173	INDUCTOR-AXIAL	330nH,20%,4.2x9.8mm	
R181	63.9	65.9	2001-001107	R-CARBON(S)	220ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R182	67.9	49.1	2001-001138	R-CARBON(S)	390ohm,5%,1/2W,AA,TP,2.4x6.4mm	
RB17	33.4	39	2002-000142	R-COMPOSITION	39ohm,10%,1/2W,AA,TP,3.5x9.5mm	
RG17	64.3	62.7	2002-000142	R-COMPOSITION	39ohm,10%,1/2W,AA,TP,3.5x9.5mm	
RR17	54.3	58.5	2002-000142	R-COMPOSITION	39ohm,10%,1/2W,AA,TP,3.5x9.5mm	
SK1	49.5	29.3	3704-001015	SOCKET-CRT	8P,15.24PI,25.6PI,SN	
SK101	57.6	43.5	4715-000102	SURGE ABSORBER	200V,20%,1000A,RADIAL	
SK102	70.8	25.9	4715-000102	SURGE ABSORBER	200V,20%,1000A,RADIAL	
SK103	36.8	39	4715-000102	SURGE ABSORBER	200V,20%,1000A,RADIAL	
SK104	63	22.4	4715-000106	SPARK-GAP	DSP-301N	

10-3-4 CRT PCB Parts (CKB7227L)

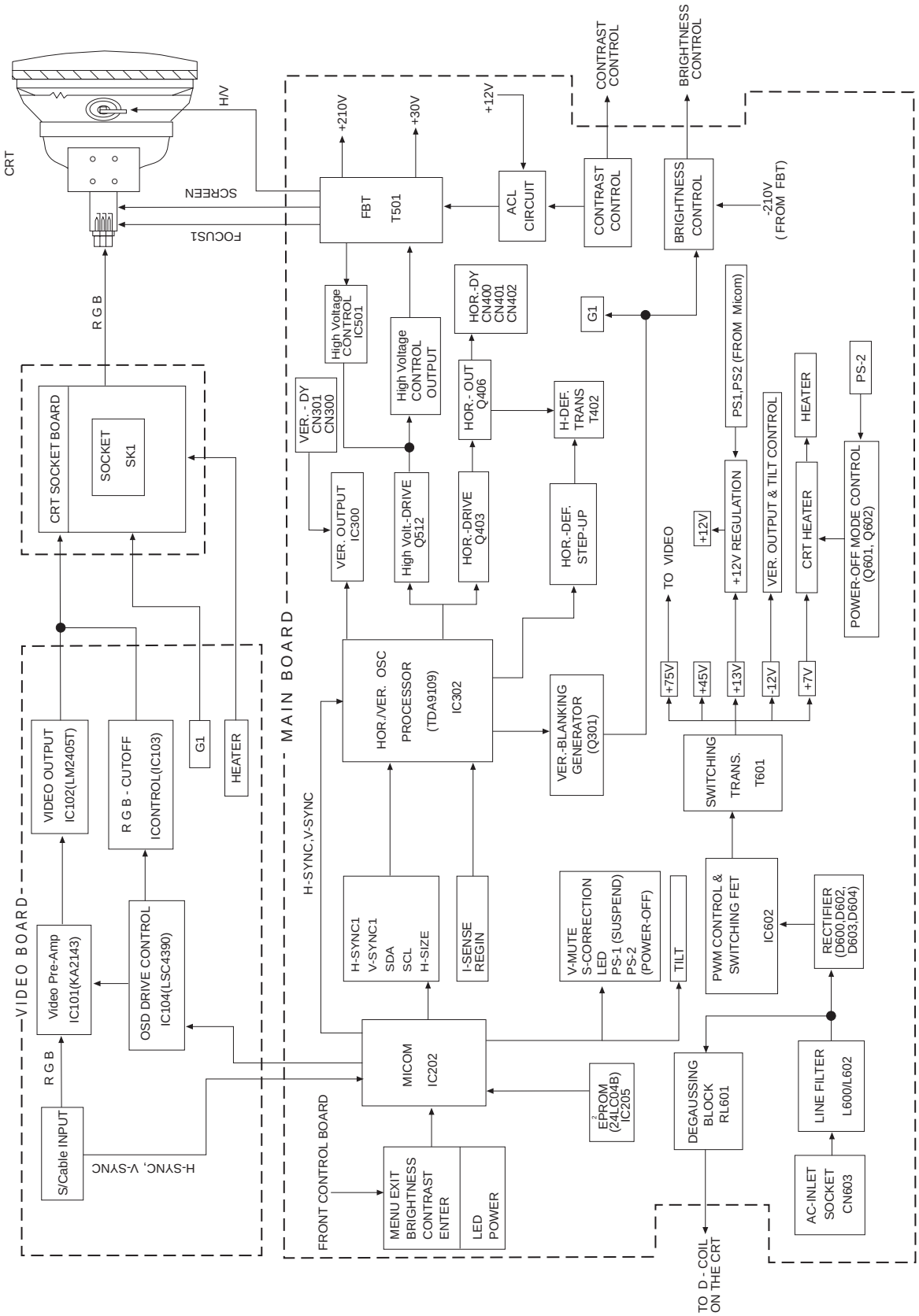
Loc. No.	Coordinates (X,Y)		New Code No.	Description	Specification	Remarks
BD102	63.8	37.1	3301-000011	MAG-CORE,FERRITE,BEAD	1.2UH,3.5_5.7MM,10 OHM	
C181	36	44.3	2202-002009	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,2.3X3.0	
C182	63.2	19.8	2201-000530	C-CERAMIC,DISC	4.7nF,10%,500V,Y5P,12.5x4,5,TP	
C183	58.7	42	2201-000285	C-CERAMIC,DISC	1nF,10%,1KV,Y5P,8.0X4.0,5,TP	
CN103	8.1	21.5	3711-001111	CONNECTOR-HEADER	BOX,8P,1R,2.50mm,ANGLE,SN	
CN12	65.9	42.8	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN13	9.7	62.9	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CN14	72.1	63	BH71-40300A	PIN-HINGE	BRASS,D2.36,SN,HEAT/SINK	
CRT1	0	0	BH03-10337T	CRT-COLOR	17 ,0.28,M41KUN36X03(E/L/LP	
LB01	23.8	34.6	2701-000173	INDUCTOR-AXIAL	330nH,20%,4.2x9.8mm	
LG01	14.5	30.8	2701-000173	INDUCTOR-AXIAL	330nH,20%,4.2x9.8mm	
LR01	19	30.9	2701-000173	INDUCTOR-AXIAL	330nH,20%,4.2x9.8mm	
R181	58.6	64.6	2001-001107	R-CARBON(S)	220ohm,5%,1/2W,AA,TP,2.4x6.4mm	
R182	57.1	33.8	2001-001138	R-CARBON(S)	390ohm,5%,1/2W,AA,TP,2.4x6.4mm	
RB17	28.1	40	2002-000142	R-COMPOSITION	39ohm,10%,1/2W,AA,TP,3.5x9.5mm	
RG17	58.4	61.4	2002-000142	R-COMPOSITION	39ohm,10%,1/2W,AA,TP,3.5x9.5mm	
RR17	48.6	57	2002-000142	R-COMPOSITION	39ohm,10%,1/2W,AA,TP,3.5x9.5mm	
SK1	39.5	29.4	3704-000108	PHI29_D/F,SMALL TYPE	CON-JACK CRT SOCKET,12P	
SK101	45.1	43.6	4715-000102	SURGE ABSORBER	200V,20%,1000A,RADIAL	
SK102	67	24.5	4715-000106	SPARK-GAP	DSP-301N	
SK103	31.6	42.9	4715-000102	SURGE ABSORBER	200V,20%,1000A,RADIAL	
SK104	58.7	19.8	4715-000106	SPARK-GAP	DSP-301N	

Others

Loc. No.	Code No.	Description	Specification	Remarks
CRT	BH03-10337W	CRT-COLOR	M36KUK35X02(E/LP),MPR-II	15Inch SDD
	BH03-10338V	CRT-COLOR	M36KUK35X02(A/LP),MPR-II	"
	BH03-10337X	CRT-COLOR	M36KUK35X02(T4/LP),MPR-II	"
	BH03-10338R	CRT-COLOR	M36KUK35X02(M/E/LP),MPR-II	"
	BH03-10338S	CRT-COLOR	M36KUK35X02(R/E/LP),MPR-II	"
	BH03-10301F	CRT-COLOR	M36EDR320X131,MPR-II	15Inch PHS
	BH03-10337T	CRT-COLOR	M41KUN36X03(/L/LP)	17Inch SDD
	BH03-10337U	CRT-COLOR	M41KUN36X03(A/L/LP)	"
	BH03-10337V	CRT-COLOR	M41KUN36X03(T4/L/LP)	"
	BH03-10339C	CRT-COLOR	M41KUN36X03(M/E/L/LP)	"
	BH03-10339D	CRT-COLOR	M41KUN36X03(R/E/L/LP)	"
	BH03-10336A	CRT-COLOR	M41KXH110X66	17Inch MEC
CRT GND	BH39-40362C	CBF-CRT GROUND	1P,320MM,BLK,UL1015,AWG18	17Inch
	BH39-40362B	CBF-CRT GROUND	1P,280MM,BLK,UL1015,AWG18	15Inch
D-COIL	BH27-10335D	DEGAUSSING COIL	305*325*1640,11.7mH	17Inch
	BH27-10335K	DEGAUSSING COIL	300*225*950,8.2mH	15Inch
MAGNET RUBBER	3302-000006	MAG-RUBBER MAGNET	AF,14G,1620-1980G	
PROCESS-PWA UNIT	BH94-30007R	ASS'Y PCB	CKB7227	17Inch
	BH94-30007S	ASS'Y PCB	CKB5237	15Inch
P/CORD	BH39-10005A	CBF-POWER/CORD	CAP,1VR,1220MM,220V	IBM CAP TYPE
	BH39-10002A	CBF-POWER/CORD	WALL,1VR,1850MM,110V	SEA
	BH39-10006A	CBF-POWER/CORD	WALL,1VR,1830MM,220V	SEAU
	BH39-10007A	CBF-POWER/CORD	WALL,1VR,1830MM,220V	SEUK
	BH39-10307A	CBF-POWER/CORD	WALL,1VR,1830MM,110V	JAPAN
	BH39-10339A	CBF-POWER/CORD	WALL,GRY,1830MM,220V(only S/M model)	SEUK
	BH39-10339N	CBF-POWER/CORD	WALL,1VR,1550MM,220V	CHINA
	BH39-10339E	CBF-POWER/CORD	WALL,IVR,1830MM,110V	
SIGNAL CABLE	BH39-203336U	CBF-SIGNAL	ATT,2000MM,15P,IVORY,UL	17Inch
	BH39-20336W	CBF-SIGNAL	ATT,1700MM,15P,IVORY,UL	15Inch

8 Block Diagrams

CKB5237L



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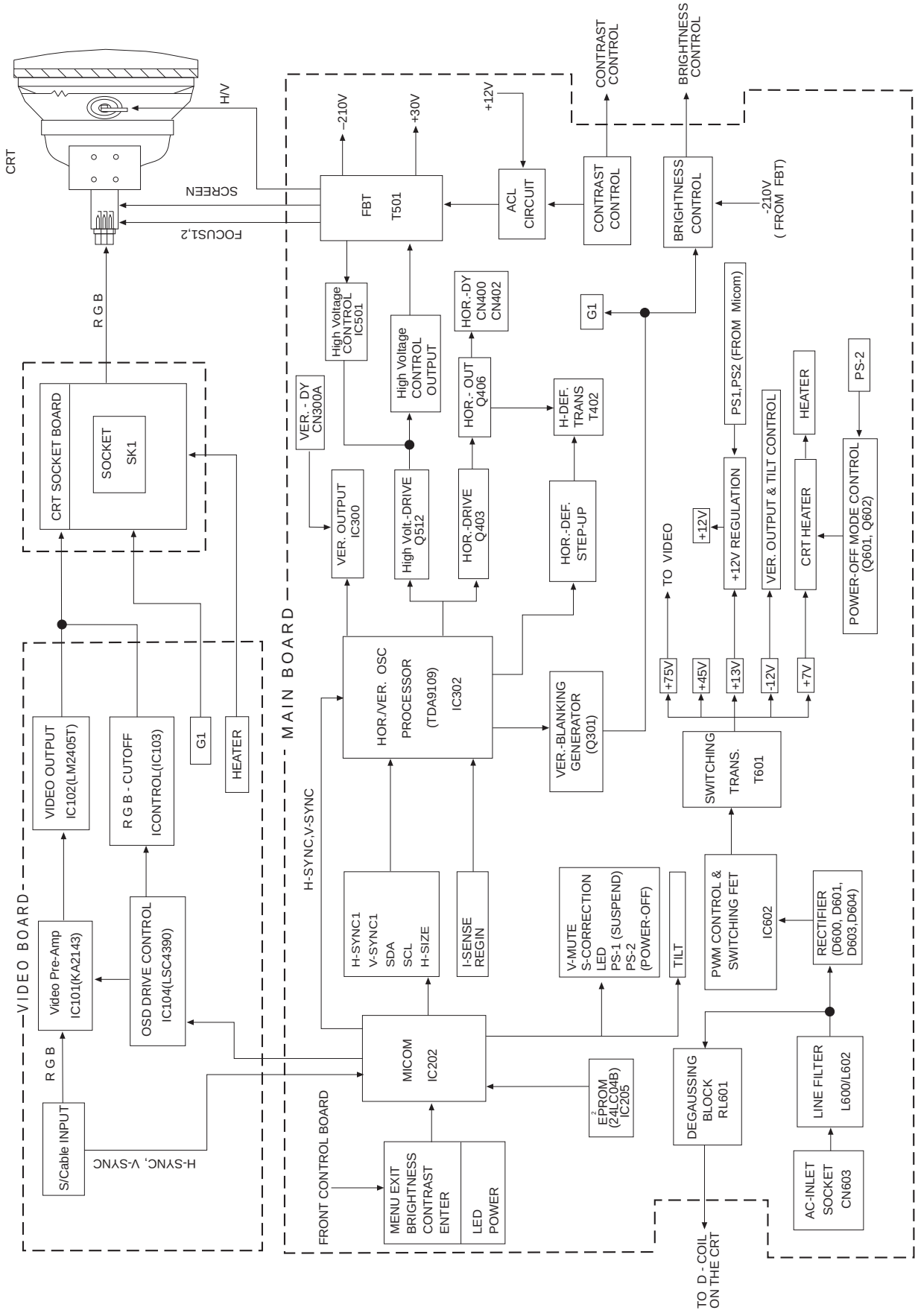
CRT
H/V
SCREEN
FOCUS1,2
R G B
CRT SOCKET BOARD
SOCKET
SK1
VIDEO BOARD
VIDEO OUTPUT
IC102(LM2405T)
R G B - CUTOFF
ICONTROL(IC103)
G1
HEATER
Video Pre-Amp
IC101(KA2143)
OSD DRIVE CONTROL
IC104(LSC4390)
R G B
S/Cable INPUT
H-SYNC, V-SYNC
MAIN BOARD
FBT
T501
-210V
+30V
+12V
ACL
CIRCUIT
CONTRAST
CONTROL
BRIGHTNESS
CONTROL
-210V
(FROM FBT)
High Voltage
CONTROL
IC501
High Voltage
CONTROL
OUTPUT
HOR.-DY
CN400
CN402
G1
VER. - DY
CN300A
HOR.- OUT
Q406
H-DEF.
TRANS
T402
VER. OUTPUT
IC300
High Volt.-DRIVE
Q512
HOR.-DRIVE
Q403
HOR.-DEF.
STEP-UP
HOR./VER. OSC
PROCESSOR
(TDA9109)
IC302
VER.-BLANKING
GENERATOR
(Q301)
H-SYNC,V-SYNC
TO VIDEO
+12V
PS1,PS2 (FROM Micom)
+12V REGULATION
VER. OUTPUT & TILT CONTROL
CRT HEATER
HEATER
PS-2
POWER-OFF MODE CONTROL
(Q601, Q602)
+75V
+45V
+13V
-12V
+7V
SWITCHING
TRANS.
T601
H-SYNC1
V-SYNC1
SDA
SCL
H-SIZE
I-SENSE
REGIN
V-MUTE
S-CORRECTION
LED
PS-1 (SUSPEND)
PS-2
(POWER-OFF)
TILT
PWM CONTROL &
SWITCHING FET
IC602
RECTIFIER
(D600, D601,
D603,D604)
MICOM
IC202
EPROM
(24LC04B)
IC205
DEGAUSSING
BLOCK
RL601
LINE FILTER
L600/L602
AC-INLET
SOCKET
CN603
FRONT CONTROL BOARD
MENU EXIT
BRIGHTNESS
CONTRAST
ENTER
LED
POWER
TO D - COIL
ON THE CRT

10-4 Semiconductor Lead Identification

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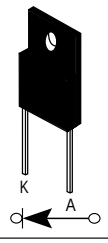
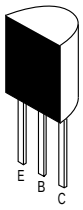
	FMP-G2FS	D403
	KSC945	Q201, Q301, Q417_7, Q517, Q602, Q604
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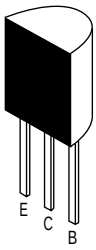	KSC2316-Y	Q510
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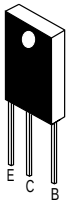	KSB772	Q601
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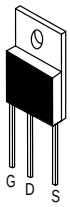	IRF630	Q409
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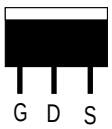	IRFR/U230A	Q405, Q408

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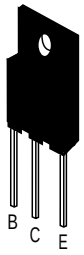	KSC5088	Q406
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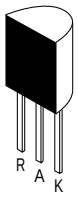	KA431	IC601
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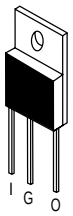
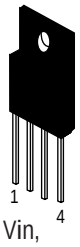
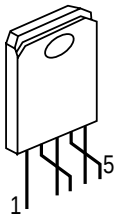
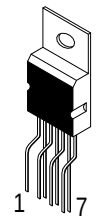
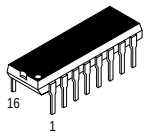
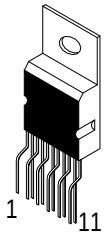
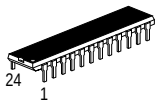
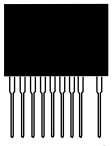
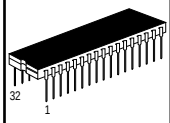
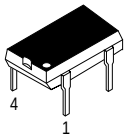
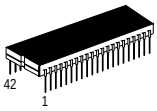
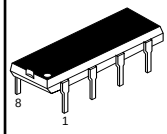
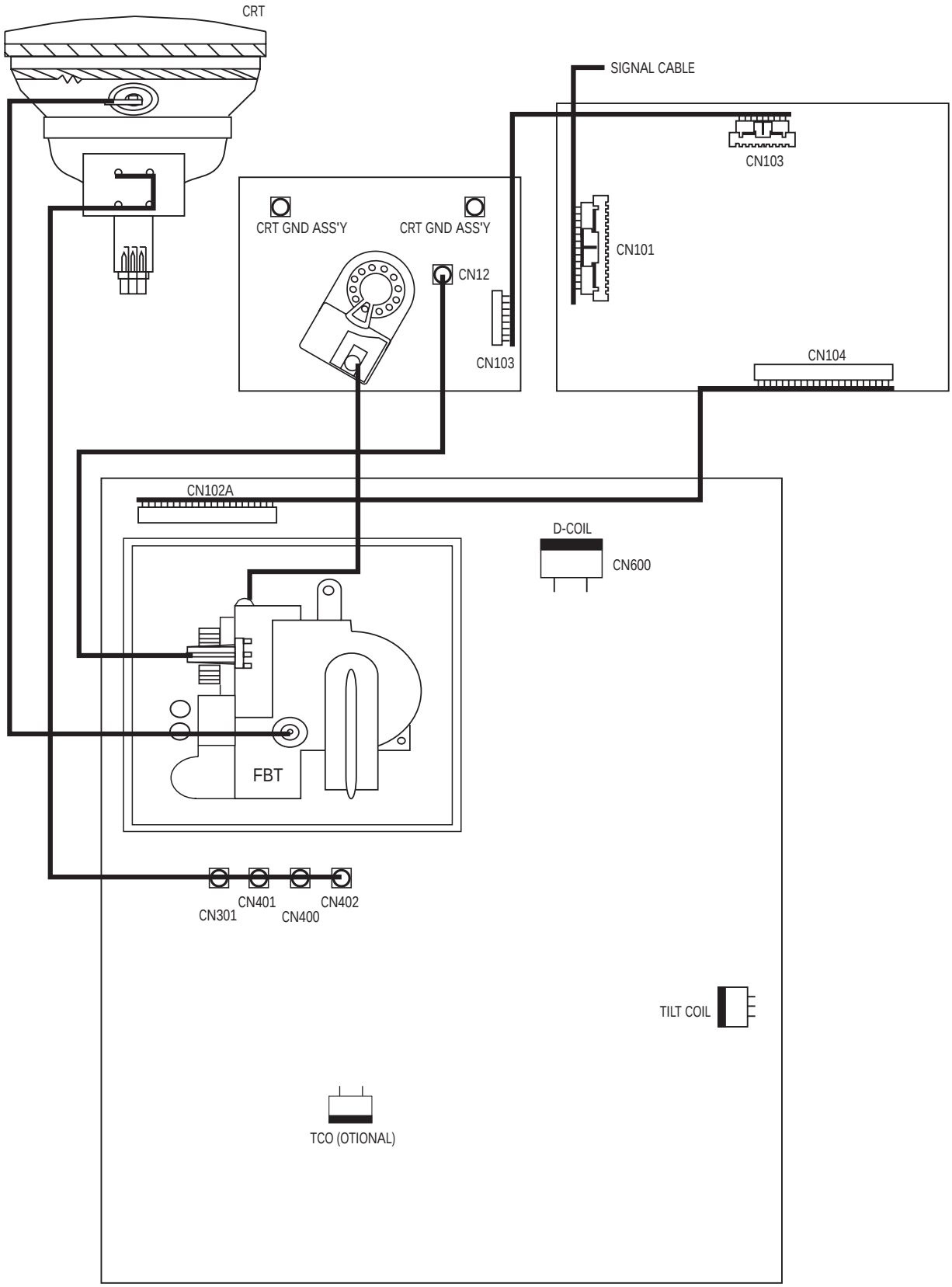
	KA7805	IC600
 1 : Vin, 2 : Vout, 3 : GND, 4 : Vcc	KA78R12	IC603
 1 : Drain, 2 : GND, 3 : Vcc, 4 : F/B, 5 : Sync	KA2H0880	IC602

PARTS	TYPE NO.	REF. NO.	PARTS	TYPE NO.	REF. NO.
	TDA9302H	IC300		TL494	IC501
	LM2405	IC102		LSC4390	IC104
				KA2143	IC101
	CKB7227(IV17)	IC103		TDA9109	IC302
	LTV817M-SM	QP601		72E75	IC202
	24LC04 24LC21 L272M KA358	IC205 IC204 IC301 IC502			

9 Wiring Diagrams

CKB5237L



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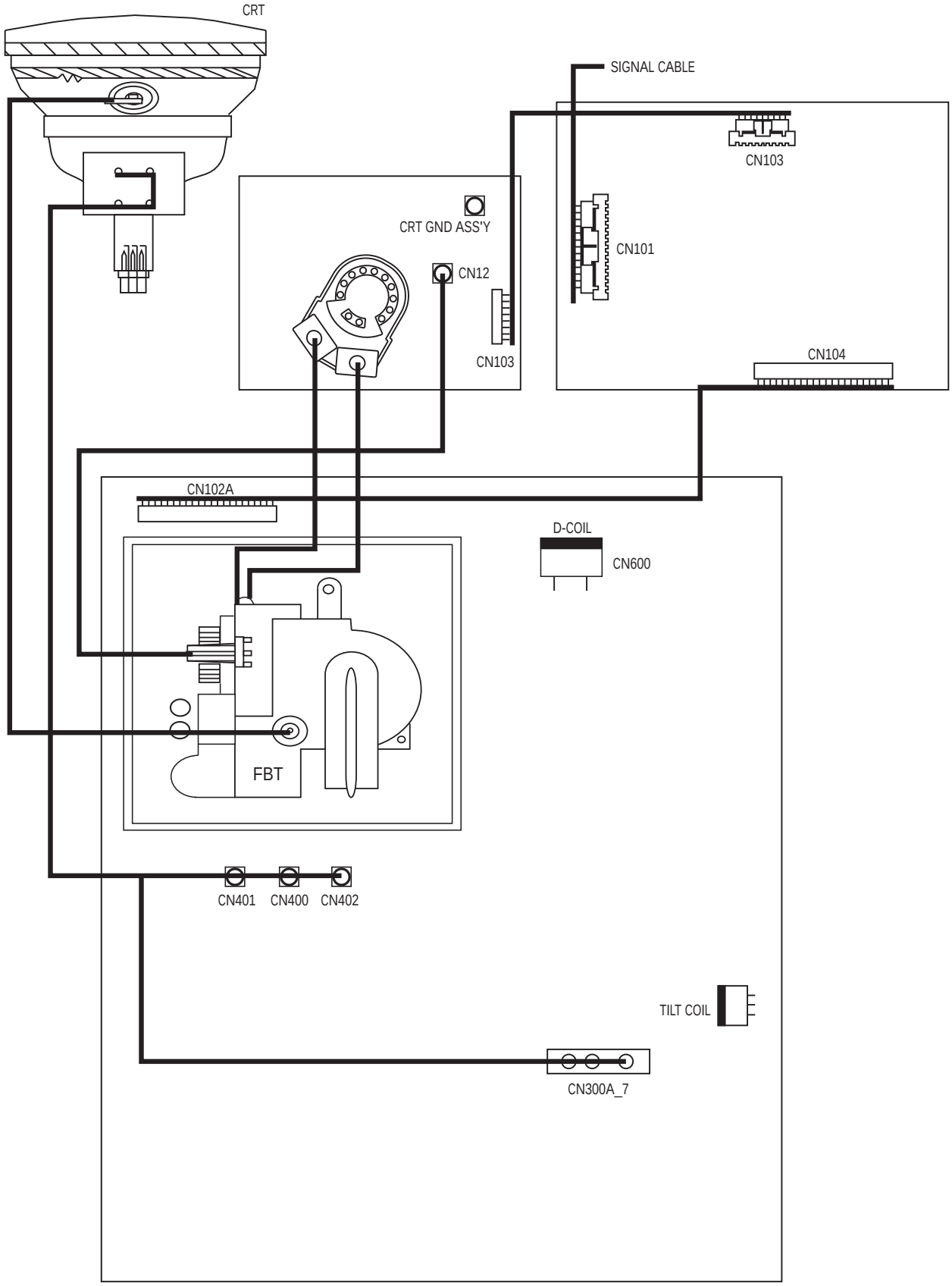

CRT
SIGNAL CABLE
CN103
CRT GND ASS'Y
CN101
CN12
CN103
CN104
CN102A
D-COIL
CN600
FBT
CN401
CN400
CN402
TILT COIL
CN300A_7

11 Schematic Diagrams

11-1 Cautions

1. The areas marked with a ⚠, ⚡ or ☢ on the schematic diagram designate components which have special characteristics important for safety.
   Replace these parts only with parts identical to those in the original circuit and those specified in the parts list.
   Before replacing any of these components, carefully read the "Product Safety Notice."
2. Areas marked with a ☢ on the schematic diagram designate controls which have been sealed for safety during manufacturing.
   If these controls need adjustment, they must be replaced with new controls and then sealed after their adjustment.
3. When taking measurements, pay special attention to the following:

   1) Do not use your instrument between primary ground (symbol ⏚) and secondary circuit.

   2) Do not use your instrument between secondary ground (symbol ⏚) and primary circuit.

11-2 Notes

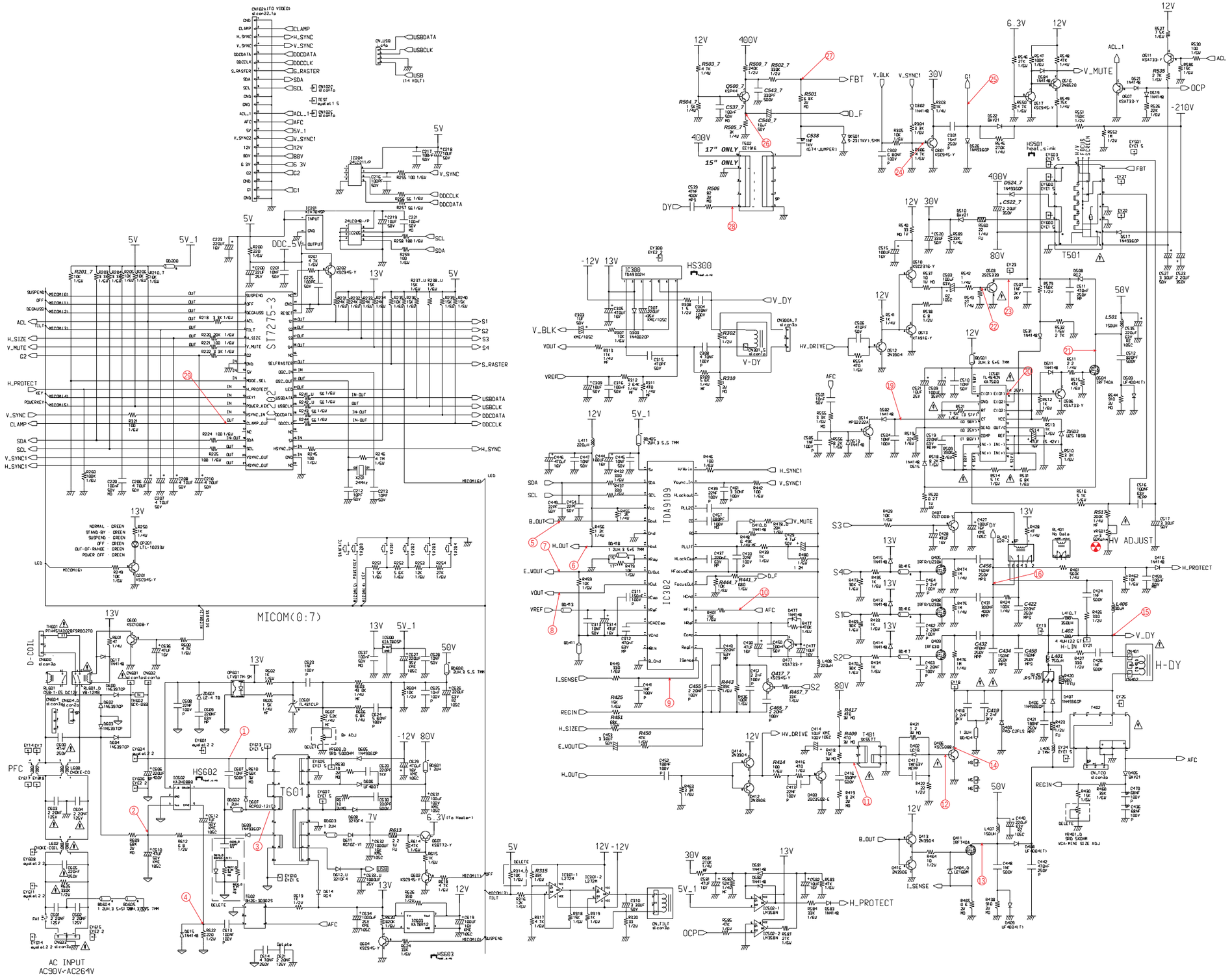
1. Resistance is shown in OHM. K = 1,000, M = 1,000,000 and the rated power of resistors not noted in the schematic diagram is 1/4W.
2. Capacitance is shown in μF. Capacitances not otherwise noted are shown in pF (1μF = 1,000,000 pF). Rated voltage of condensers not otherwise noted in the schematic diagram is 50 V.

11-3 Abbreviations and Symbols

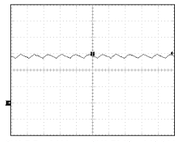
MO	R-Metal Oxide	WW	R-Wire Wound
FU	Fusible	C	R-Composition
CM	R-Cement	MPP	Metal Polypropylene
MP	C-Metalized Polyester	T	C-Tantalum
P	C-Polyester	☢	Can emit X-radiation
⏚	Hot Ground	⏚	Cold Ground
⚡	Electrostatically Sensitive Device (ESD)	⚠	Provides special safety considerations

1. The secondary voltage is read with an SSVM from the indicated point to a cold ground (⏚).
   The primary voltage is read with an SSVM from the indicated point to a hot ground (⏚).
2. This schematic diagram is subject to change without notice.

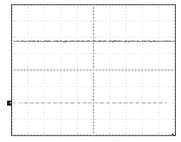
11-4 Main Schematic Diagram



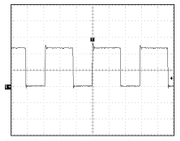
1 14 V (T601, #1), 110V



2 DC V (IC602, #3)

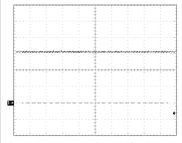


3 292 V (T601 #5), 110V

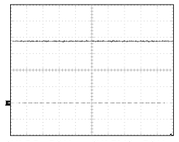


4 3.68 V (C612, –), 110V

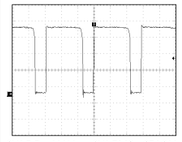
1 DC V (T601, #2), 220V



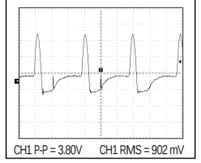
2 DC V (IC602, #3), 220V



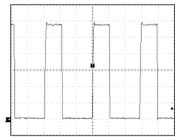
3 444 V (T601, #5), 220V



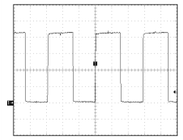
4 3.80 V (C612, –), 220V



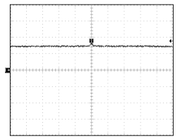
5 12.0 V (IC302, #28)



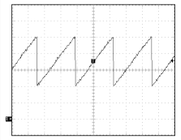
6 8.80 V (IC302, #26)



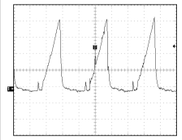
7 640 mV (IC302, #24)



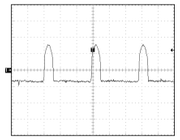
8 3.12 V (IC302, #23)



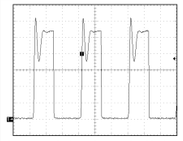
9 928 mV (IC302, #16)



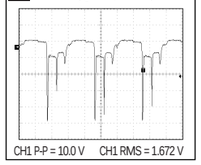
10 2.56 V (IC302, #12)



11 124.8 V (T401, #1)

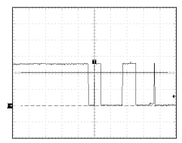


12 10.0 V (Q406, Base)

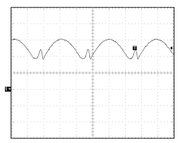


13 128 V (Q411, Drain)

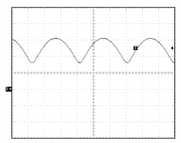
14 1.016 kV (Q406, Collector)



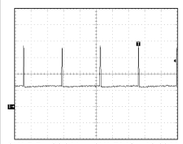
15 64 V (L402_7, S)



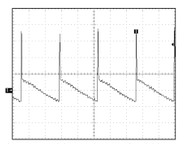
16 76 V (L402_7, F)



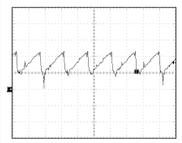
17 26.0 V (IC300, #6)



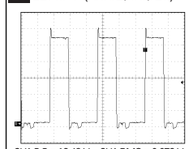
18 46.0 V (IC300 #5)



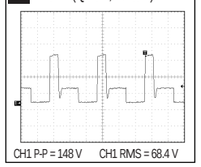
19 1.16 V (IC501 #5)



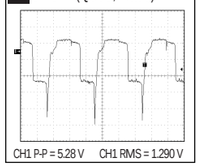
20 12.48 V (IC501, #9, 10)



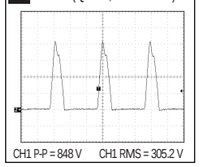
21 148 V (Q504, Drain)



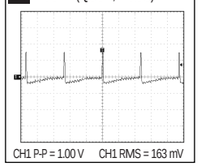
22 5.28 V (Q503, Base)



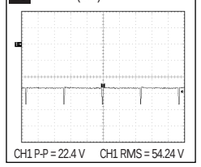
23 848 V (Q503, Collector)



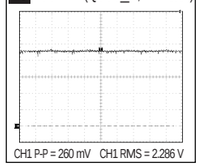
24 1.00 V (Q301, Base)



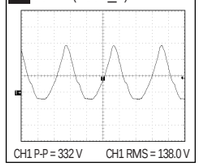
25 22.4 V (G1)



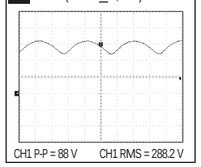
26 260 mV (Q500_7, Emitter)



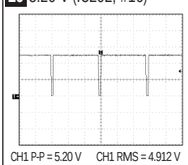
27 332 V (R502_7)



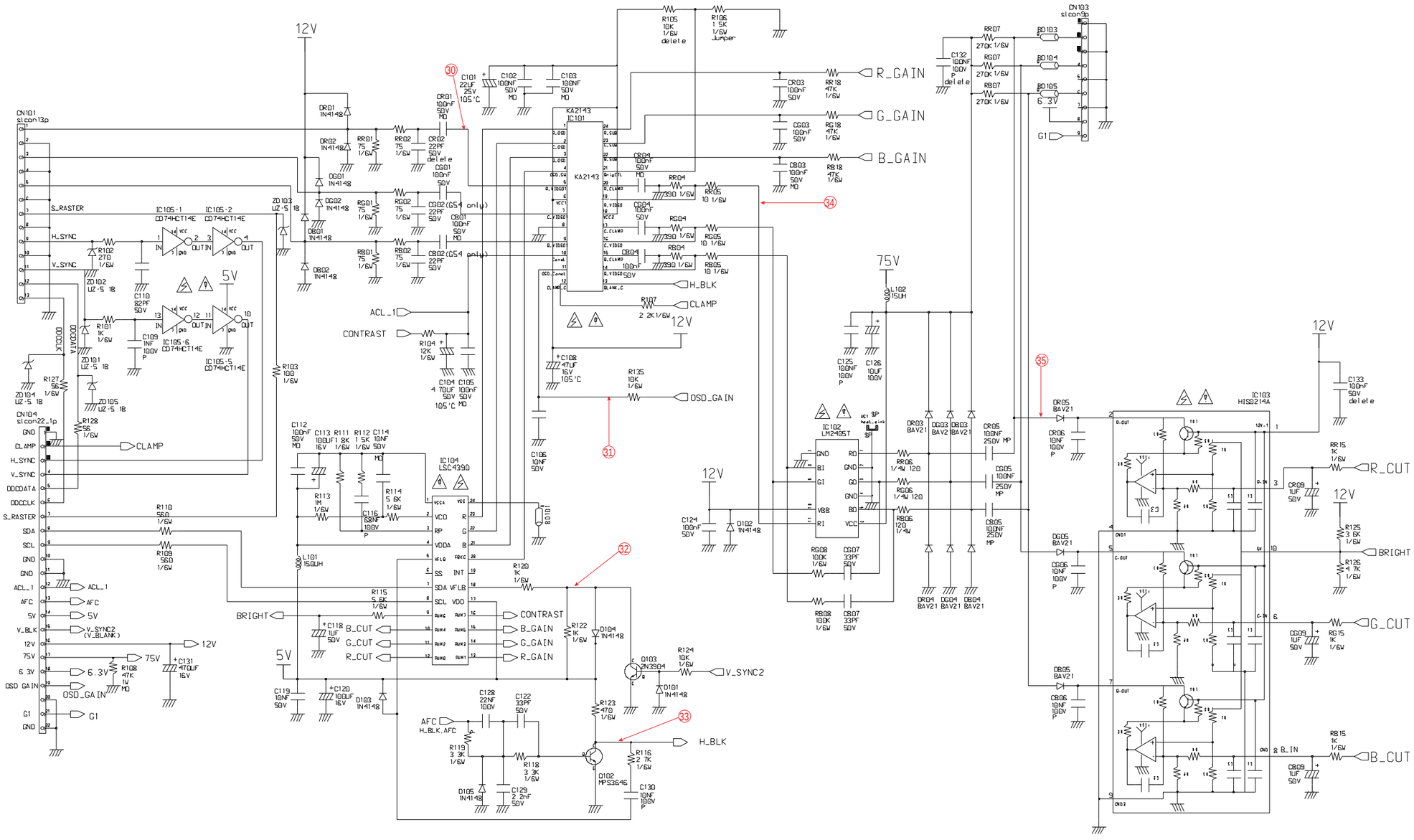
28 88 V (T502_7, #6)



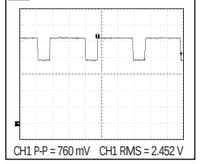
29 5.20 V (IC202, #16)



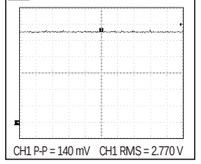
11-5 Video Schematic Diagram



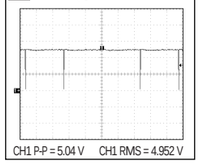
30 760 mV (IC101, #5)



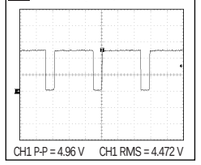
31 140 mV (IC101, #11)



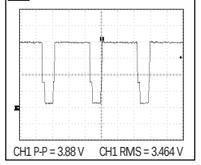
32 5.04 V (Q103, Collector)



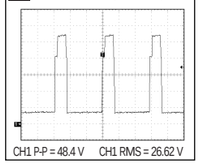
33 4.96 V (Q102, Collector)



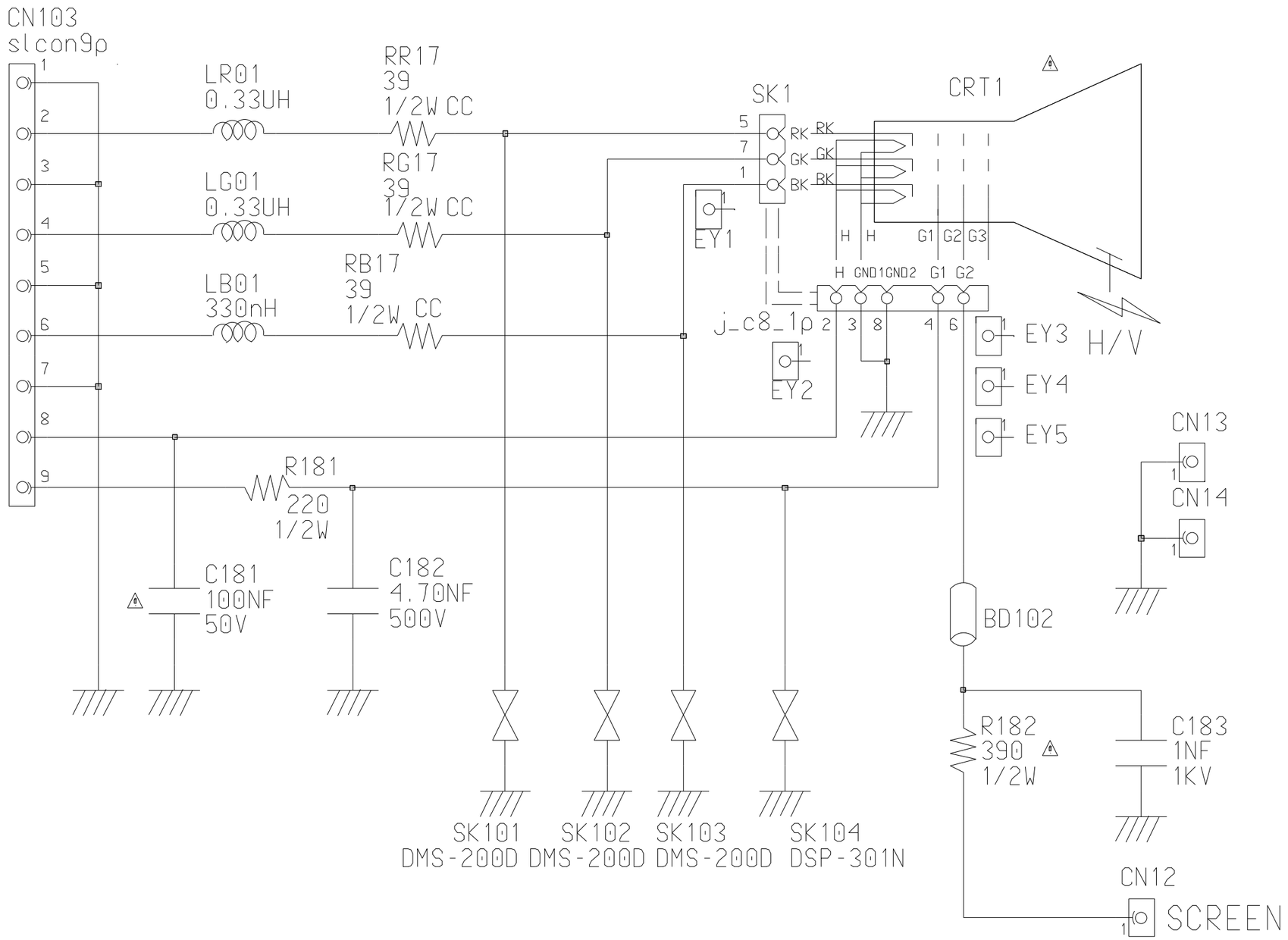
34 3.88 V (IC102, #11)



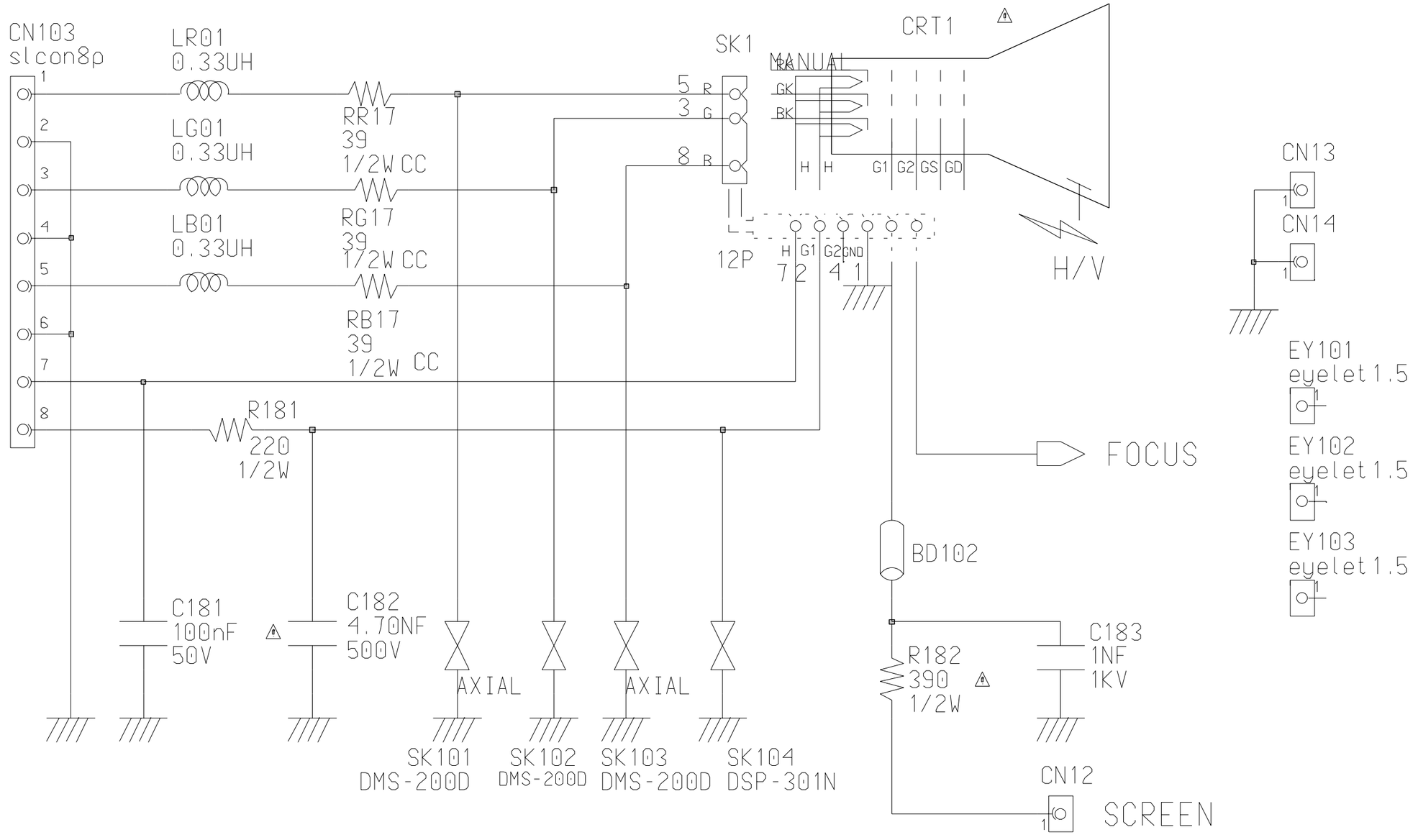
35 48.4 V (DR05, Anode)



11-6 CRT Schematic Diagram (CKB5237L)



11-7 CRT Schematic Diagram (CKB7227L)



Memo